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Southern Medical Journal

Journal of The Southern Medical Association

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $3.00 Entered as Second-Class Matter at the Postoffice at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of Oct. 3, 1917, authorized Dec. 20, 1921.

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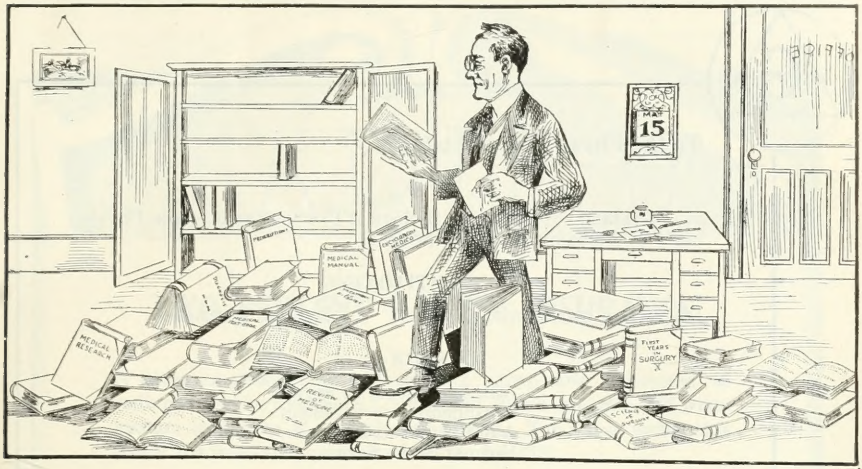

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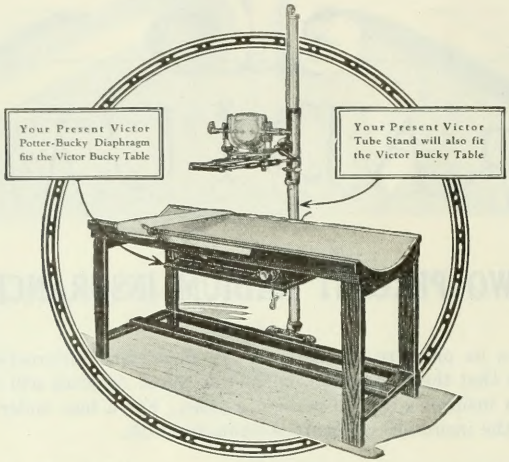
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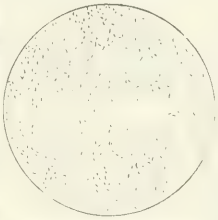

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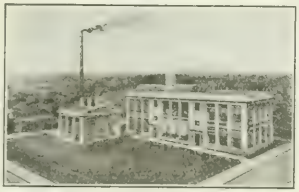

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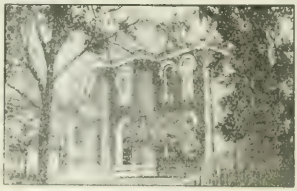

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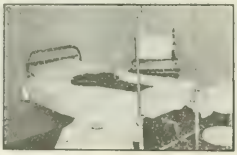

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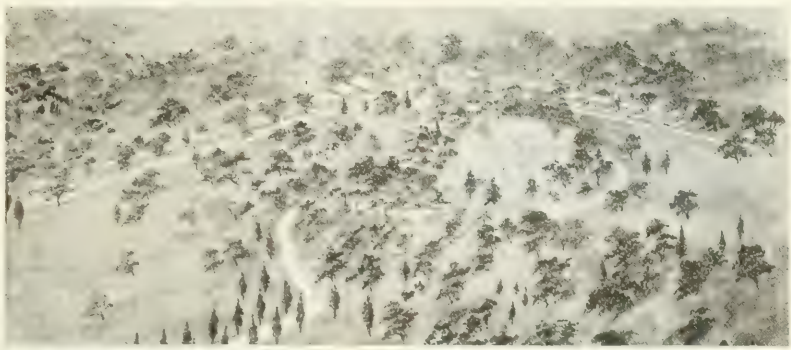

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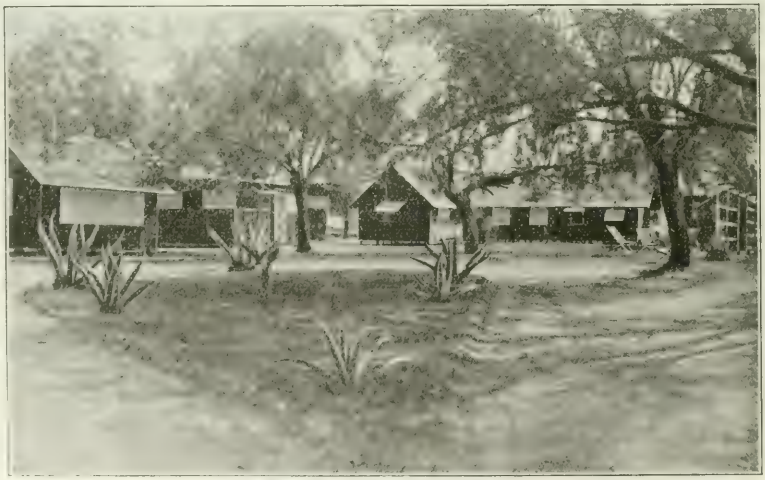

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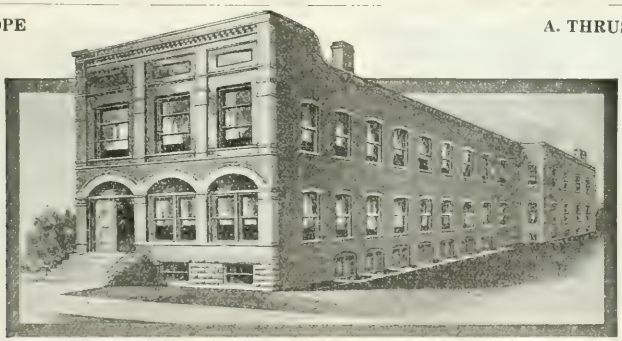

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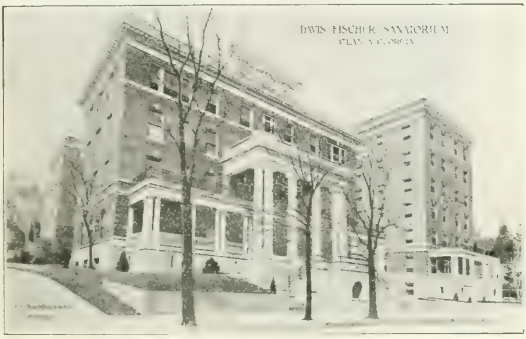

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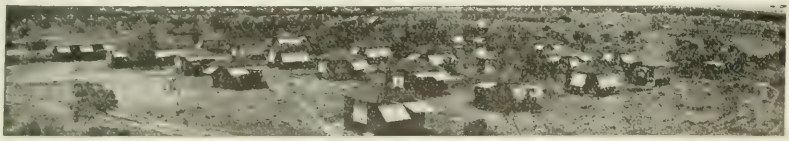

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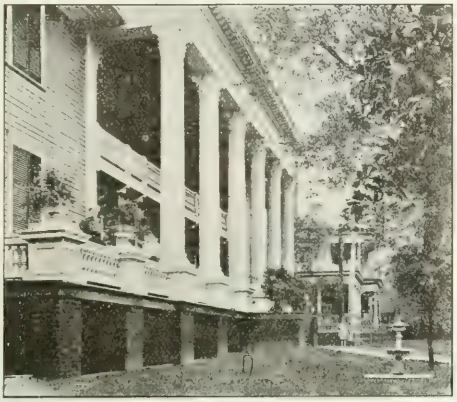

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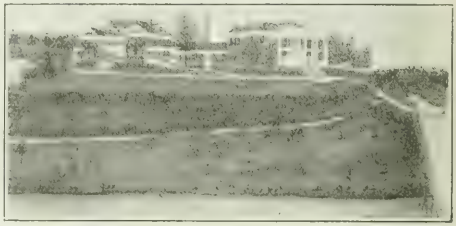

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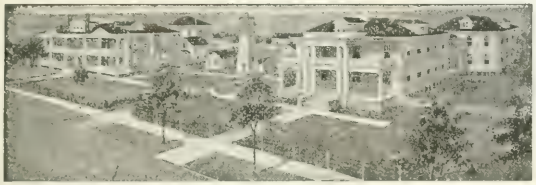

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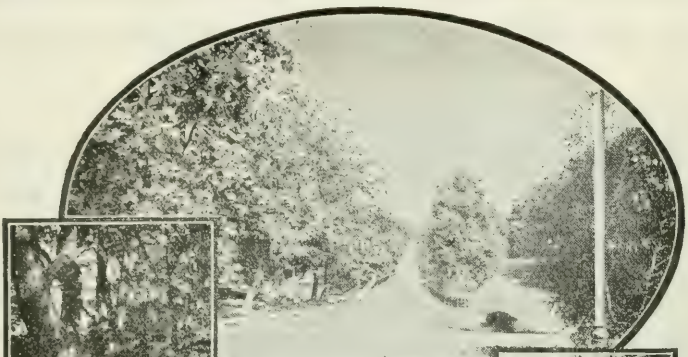

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JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

PUBLISHED MONTHLY BY THE SOUTHERN MEDICAL ASSOCIATION AT BIRMINGHAM, ALA.

Volume XV JUNE 1922 Number 6

MEDICINE

INTERNAL DISEASES, PEDIATRICS, NEUROLOGY, DIAGNOSTIC METHODS, ETC.

PULSUS ALTERNANS: ITS SIGNIFICANCE AND RECOGNITION BY ORDINARY CLINICAL METHODS*

BY RANDOLPH LYONS, M.D.,
New Orleans, La.

My interest in alternation of the pulse has been aroused by the recognition of five cases of this condition during the past twelve months. The alternating pulse was discovered while taking the blood pressure by the auscultatory method. In looking over my notes for the past few years I found but one other record of this cardiac arrythmia. This occurred in 1918, and makes a total of six cases of pulsus alternans observed over a period of three years in a purely medical practice.

Pulsus alternans may be defined as a condition of the pulse in which strong and weak beats alternate, but in which the cardiac rhythm is normal. The alternation may be constant, transient or found only after premature beats. It is generally considered to be an evidence of depression of contractility, although this may not be the only factor in its production. The general impression gained from looking over the literature at hand is that alternation of the pulse is rather rare, or more probably is frequently overlooked except by cardiologists employing routinely graphic methods. It is usually given third place among the arrythmias. Some cardiologists go even further and state that it is as common as auricular fibrillation (White, P. D.)[1]. Gravier,[2] in his monograph on alternation of the heart, has no doubt that alternating pulse will soon be recognized as a frequent symptom of cardiac insufficiency.

The relative frequency of pulsus alternans would appear to depend almost wholly upon whether or not we use graphic records in the examination of all our cardiac or cardio-renal patients. This is unfortunate, for the electro-cardiograph is out of the reach of most practitioners and even the sphygmograph is still an expensive and time-consuming instrument. The physician is compelled to fall back upon some simpler method of eliciting this important and serious symptom.

NON-GRAPHIC METHODS OF DETECTING PULSUS ALTERNANS

Since Hoffman,[3] in 1906, first described the use of compression of the brachial artery in augmenting and revealing an alternation of the pulse, a number of papers have been published. Rehberg[4] described a method which consisted in finding a difference in the blood pressure of alternating beats. Gravier described a bimanual method. Herrick[5] advocated the use of palpatory blood pressure in detecting this condition, but states that the auscultatory method may also be used. McGill[6] describes a case of pulsus alternans detected by the auscultatory blood pressure method.

*Read in Section on Medicine, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

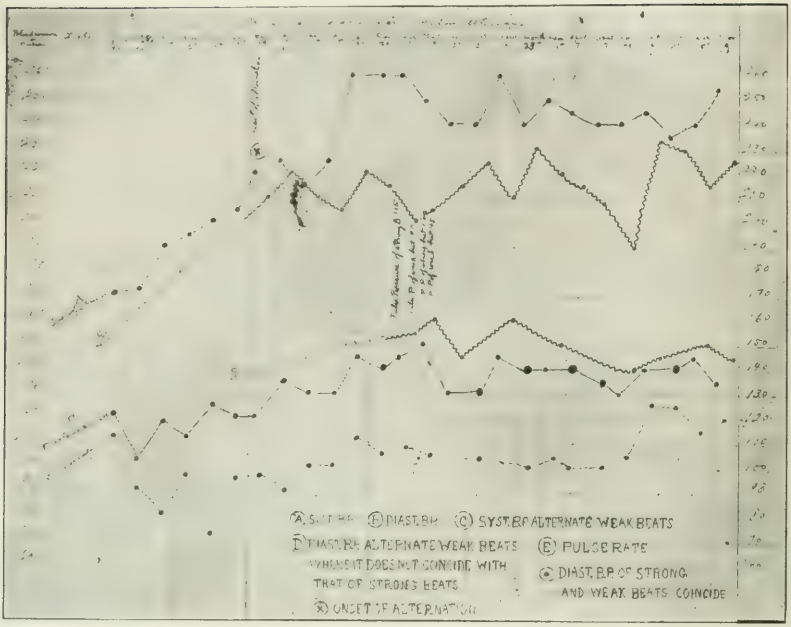
(E) DIAST. BP.
(C) SYST. BP. ALTERNATE WEAK BEATS
(D) DIAST. BP. ALTERNATE WEAK BEATS WHEN IT DOES NOT COINCIDE WITH THAT OF STRONG BEATS
(B) PULSE RATE
DIAST. B.P. OF STRONG AND WEAK BEATS COINCIDE
ONSET OF ALTERNATION

Fig. 1.

Explanation of Chart: A. Uppermost curve represents the systolic blood pressure. B. Represents the diastolic pressure. Note that on February 5 the diastolic pressure of the alternate weak beat occurs at a higher level than that of the strong beats. From this place on, where the diastolic pressure for both strong and weak beats is apparently the same, it is indicated on the chart by a circle around the black dot. C. Upper wave curve represents the systolic blood pressure of alternate weak beats. D. Lower wave curve represents the diastolic pressure of alternate weak beats where it does not coincide with that of the stronger beats. E. Lowest curve represents the pulse rate.

White and Lunt[7] studied blood pressure methods of detecting alternating pulse and concluded that about once in six times an error would be made of confusing pseudo-alternation with true alternation. Sir James Mackenzie[8] describes the auscultatory blood pressure method and further states that by this method the distinction can also be made between the pulsus bigeminus and pulsus alternans. John Hay[9] says that the recognition of pulsus alternans is not as a rule difficult when graphic methods are made or during the estimation of the blood pressure. Edgecombe[10] considers that pulsus alternans can seldom be determined by touch alone, but sometimes may be heard in taking blood pressure. Calvin Smith[11] describes a bedside maneuver of compression of the brachial artery which brings out the alternation of the pulse. Lian and Boulet[12] state that even in cases where the alternation was not pronounced it was readily recognized by the sphygmomanometer. Chalier and Contamin[13] describe the method of bimanual palpation as instructive; that is, compressing the brachial artery with one hand, with the other at the radial pulse.

Other reports from the literature might be cited to illustrate the point that efforts are being made by investigators to discover simpler methods of detecting this condition and of determining the relative accuracy of such procedures as compared with graphic methods. The chief source of error in the non-graphic methods is undoubtedly a bigeminal pulse due to

very late premature contractions. Another condition which, according to White and Lunt, may produce a pulse which seems to be constantly alternating but which is in reality a pseudo-alternans is a rapid respiratory rate which is one-half, or almost one-half, of the pulse rate. This pseudo-alternation is readily recognized by having the patient hold the breath for a few seconds. The former condition cannot always be detected without graphic records.

THE AUSCULTATORY BLOOD PRESSURE METHOD

Of the various non-graphic methods described in the literature for the detection of alternating pulse, the auscultatory blood pressure method was found to be by far the most satisfactory and delicate. As the procedure is familiar to all, there are but one or two points that require stressing. It is essential that there be not the slightest leak in the sphygmomanometer. The pressure must be very gradually and slowly released, for it frequently occurs that the systolic pressure of the strong beat may not be over five to ten millimeters higher than the weak beat. Mackenzie[8] gives the following clear description:

"The armlet is distended until the artery is obliterated. On listening with the stethoscope at the bend of the elbow, the returning blood wave in the artery under the stethoscope shows its presence by a sound. When pulsus alternans is present this sound is only half the rate of the heart at first, when pressure falls another five to ten mm. Hg, the weaker beat comes through, and one can detect then a sound accompanying each beat of the heart. At first the beats will be unequal in volume, but as the pressure falls lower they become equal. * * * the distinction can also be made betwixt the pulsus bigeminus, when the smaller beat is due to extra-systoles, by the fact that when all the beats are heard the sounds are perfectly regular in the case of pulsus alternans, whereas there is always a delay after the weaker beat in pulsus bigeminus."

In the majority of cases of alternating pulse the diastolic pressure is apparently the same for both weak and strong beats as the sounds become equal. I have observed, however, in two patients, especially Case 1, that where the difference in systolic pressure of strong and weak beats exceeds 20 mm. Hg, the sounds may not be quite equal in intensity and the diastolic pressure of each beat may be obtained. The diastolic pressure of the strong beat is always lower than that of the weaker beat, giving it a greater pulse pressure. In the detection of alternation, either air or mercury manometers may be used, although the oscillations of the needle in the former may aid in calling attention to this condition.

Of the five cases to be reported there was but one in which alternation of the pulse has been constant, the remaining four cases being transient types. As Case 1 is the most interesting of the group, I shall go into some detail concerning it.

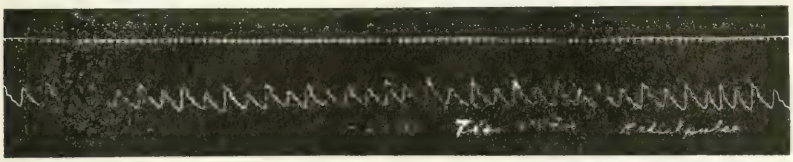

Fig. 2.

Case 1.—Epistaxis, cardiac dilatation, hypertension, chronic nephritis, constant pulsus alternans.

Mr. Thomas W., mill superintendent, 43 years of age, was admitted to the Touro Infirmary at 2 a. m. November 24, 1920, because of an uncontrollable epistaxis which began the previous morning. There was no history of trauma. Dr. Leake examined the nose and throat and found a general ooze from surface of nose and nasopharynx, but no distinct spot of bleeding. I was asked to see the case in consultation.

Past History.—Except for the usual ills of childhood his history was negative up to nine years ago, when he was suspected of having pulmonary tuberculosis, but recovered his health in six weeks. Two months before the onset of the present trouble he had a severe hemorrhage following the extraction of a tooth. A physician was called in, who told him his blood pressure was high. After recovery from this attack he states he felt perfectly well. Denies all venereal

infection. In his occupation of superintendent he frequently lifts heavy cases.

Family History.—Negative except that his mother died of Bright's disease.

Physical Examination. — Temperature 97.2, pulse 120, respiration 20. Well developed and nourished man, very nervous. Mucous membranes slightly cyanotic; no edema of feet; many dilated venules on nose and cheeks; no adenopathy. Knee jerks very active.

Head and Neck.—Teeth show marked pyorrhea alveolaris. Tongue clean. Blood oozing from pack in nose. Neck thick; arterial and venous pulsations can be seen. Thyroid not palpable.

Thorax.—Very well developed and symmetrical. Lungs negative; no edema of bases.

Heart.—Heaving apex beat can be seen and felt 2 cm. to the left of mid-clavicular line; on percussion heart enlarged to left and slightly to right. At apex, first sound is reduplicated. Aortic second sound is louder than pulmonic second sound, but all sounds are weak. Radials moderately thickened; pulse regular but rapid (120). Blood pressure: systolic 170, diastolic 120.

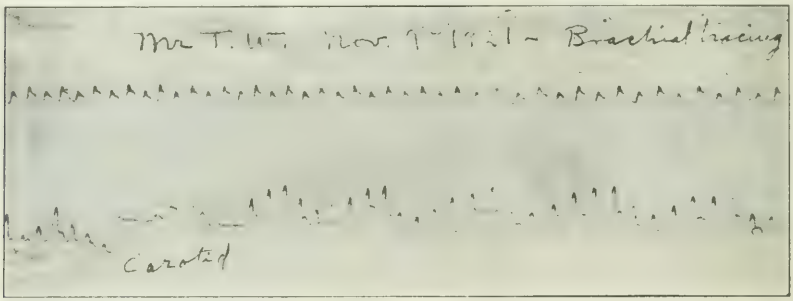

Fig. 3

Abdomen.—Rather prominent (fat). Upper border of liver in fifth i. c. s., lower border two fingers' breadth below costal margin in mid-clavicular line. Liver border rather hard, but not tender. Spleen not palpable.

Wassermann reaction negative.

Blood hemoglobin, 75 per cent; erythrocytes, 4,900,000; leucocytes, 7,750; polymorphonuclears, 60 per cent; lymphocytes, 40 per cent.

Urine.—Specific gravity, 1.024; slight trace of albumin; few hyaline casts.

Phenolsulphonephthalein Test.—Fifty per cent in two hours.

Course.—The patient remained one week in the hospital at absolute rest on a salt-free, low protein diet. Bowels kept opened. During this time the hemorrhage from the nose gradually ceased. The pulse rate was reduced to between 90 and 100. Blood pressure observations taken daily showed very little change in systolic, but some diminution in diastolic pressure. When discharged the blood pressure was 172 systolic, 102 diastolic. Two days previous to discharge the liver was just palpable. He went home on December 1, 1920.

December 6, 1920.—Pulse 96, blood pressure 195/112. Heart somewhat smaller. Liver not palpable.

December 10, 1920.—Blood pressure 200/124.

December 15, 1920.—Pulse 96, blood pressure 205/120. Auscultation of heart revealed reduplicated first sound at apex and accentuated aortic second sound.

December 19, 1920.—On this date alternation was first noted. The pulse rate was 96, regular and the systolic blood pressure was 220. At this level only every other beat is heard, thus halving the pulse rate (48). At 210 all beats come through, but every alternate beat is intensified. On slowly releasing the pressure in the cuff it is found that at 180 all sounds are equal in intensity and are very loud before the fourth phase. The diastolic pressure for both strong and weak beats is 120. Heart sounds show no change in intensity with strong and weak beats, but a soft systolic blow is present at mitral and tricuspid regions.

January 5, 1921.—On this date a curious observation was made. The pulse was 90, regular. Systolic blood pressure, strong beats 225, weaker beats 220, but the sound heard over the artery was reduplicated or split. As the pressure was released it became very soft, then loud again at 200 mm., but still split. Diastolic pressure 135. On auscultation of the heart there was present not only the reduplication of the first sound, but also a marked reduplication of the second sound.

January 12, 1921.—Patient very nervous; insists on sitting up in a chair. Blood pressure 215/130. Slight alternation present.

January 17, 1921.—Alternation more marked. Pulse 100; systolic pressure of strong beats 225, weaker beats 205. The irregularity in the volume of the beats persist down to the diastolic pressure, which was 130.

January 23, 1921.—Alternation easily felt when taking the pulse. Auscultatory blood pressure method, systolic strong beats 260, weak

beats 220. All beats audible at 220, but marked alternation could be heard until the diastolic reading at 148. Palpatory blood pressure method, systolic, strong beats 240, weak beats 200.

February 5, 1921.—Here for the first time the diastolic pressure for both weaker and stronger beats could be determined because of the persistence of the alternation in the intensity of the two sounds. Furthermore, on this date the greatest difference in the systolic pressure of the two beats was noted. The alternation could easily be felt at the radials, but auscultation of the heart failed to show it. Blood pressure: systolic strong beat 260, weak beat 200. Diastolic pressure of weaker beats 155 and stronger beats 145. Patient feels well. No pain, no dyspnea; complains of nervousness at night.

March 23, 1921.—Alternation very much improved. Systolic pressure strong beats 240, weak beats 230, diastolic pressure of both 140. Took a short drive for first time. Urine still shows a slight trace of albumin and an occasional hyaline cast and a specific gravity of 1.020.

May 6, 1921.—Patient insists upon doing a half day's work. Pulse 124, alternation scarcely perceptible. Blood pressure: systolic strong beats 235, weak beats 230; diastolic pressure, both beats 140.

August 5, 1921.—Pulse 115; marked alternation present.

November 9, 1921.—States he feels well. He works all day, but sitting most of the time. He has been warned of the gravity of his condition, but will probably not follow advice given. Pulse 120. Blood pressure: strong beats 255, weak beats 225; diastolic strong beat 135, weak beat 145. Alternation marked. Auscultation of heart reveals slight reduplication of the first sound and accentuated aortic second sound. Brachial tracing taken, but owing to nervousness of the patient no satisfactory venous tracing could be obtained.

This case presents the spectacle of the lowering of a high blood pressure secondary to severe hemorrhage and myocardial insufficiency. Under absolute rest in bed, a salt-free, low protein diet, the blood pressure gradually rose from systolic 170, diastolic 120 to systolic 260, diastolic 145, during a period of two months. Alternation of the pulse first made its appearance 25 days after the onset and has persisted for almost a year. It was discovered by the auscultatory blood pressure method as described above. On listening over the brachial artery when the alternation was marked, the difference in intensity of the strong and weak beats could be frequently distinguished until the diastolic pressure was reached. This made it possible, in a number of observations, to determine fairly accurately the diastolic pressure of the strong and weak beats independently. The diastolic pressure of the strong beats was always lower than that of the weak beats. Furthermore, it was possible in this case to detect an alternation of only 5 mm. Hg. The greatest alternation found was 60 mm. Hg. An interesting single observation made in this case was the splitting or doubling of the sounds heard at the bend of the elbow at a time when the alternation was slight, the strong beats appearing at 225 and all beats at 220. This doubled sound was noted until pressure had fallen to 190 mm. Hg. The diastolic reading was 135. On listening to the heart it was found that there was for the first time a marked reduplication of the second sound of the heart. Heart rate regular, 90 per minute. I have assumed that this was a transmission of the split second sound through the blood current as low as the brachial artery. It was never present on subsequent examinations nor did the heart show a split second sound again, although it was repeatedly searched for.

Case 2.—Chronic interstitial nephritis, arteriosclerosis, hypertension, hypertrophic arthritis of spine, right hemiplegia, transient pulsus alternans.

Miss Grace P., 62 years of age, a school teacher, was seen April 2, 1921, suffering with a severe case of grippe. As a child she had had a virulent case of diphtheria and had suffered from frequent sore throat since. She stated that her heart had been weak for a number of years. Nervous breakdown in 1912; also developed spinal trouble for first time during that year. In January, 1913, her blood pressure was 170 systolic, and in 1917 she had a stroke of apoplexy (right hemiplegia).

Physical Examination.—Patient is a stout, small, pale woman with a cervicodorsal kyphosis. Temperature 102, pulse 120, respiration 24. Lungs negative except for slight edema of bases. Heart enlarged to left; apex sounds fairly loud; aortic second sound accentuated; soft systolic blow over pulmonic area; very occasional extrasystoles; vessels markedly sclerosed. Abdomen prominent, but negative. No edema of feet. Urine shows trace of albumin; specific gravity 1.020; fairly many hyaline casts and granular casts; many leucocytes.

Course.—Patient made a slow recovery. Alternation of the pulse was discovered on April 23, 1921, at the beginning of her convalescence. The systolic blood pressure was 190 for the strong beats and 170 for the weak beats; diastolic pressure for the strong beats was 100 and weak beats 110. Occasional extra-systoles were present. The pulse was 120.

I unfortunately was not able to examine the patient again until May, 1921. At that time the pulse was 92, blood pressure 187/100. There were occasional extra-systoles, but no sign of

alternation could be detected. Another examination on November 4, 1921, failed to reveal any alternation. The blood pressure was 145/95.

This is another example where the inequality of volume of the two beats persisted down to the diastolic pressure, thus permitting recognition of the diastolic pressure of each alternate beat independently. This case further illustrates the effect of a severe toxemia on an overburdened heart muscle in the production of alternation. It is unfortunate that the patient could not have been observed daily in order to determine how long the alternation lasted. It may be stated, however, that after an interval of a month the heart had recovered from the grippe poison and the function of contractility was restored.

Case 3.—Chronic diffuse nephritis, uremia, mitral insufficiency, cardiac dilatation, hypertension, arteriosclerosis, transient pulsus alternans.

Mr. J. S. K., 75 years of age, retired merchant, was seen on February 4, 1921. He had been sent to New Orleans from his home in Wisconsin to escape the cold weather because of ill health. He stated he had suffered from heart and kidney trouble for fifteen years. He had a slight left-sided stroke five years ago.

Physical Examination.—Rather poorly nourished man, dyspneic; mucous membranes moderately cyanosed; edema of feet and thighs. Abdominal wall slightly edematous. Lungs: no dullness; bronchi throughout both lungs; slight edema at bases (crepitant rales). Heart markedly dilated to left, slightly to right. Loud systolic blow at apex, almost replacing first sound. Pulmonic second sound accentuated and reduplicated. Aortic second sound loud, pulse 100, regular; vessels markedly sclerotic. Blood pressure: systolic strong beats 220, all beats come through at 200; diastolic pressure 110; (alternation of pulse.) Urine scanty, contained 5 per cent moist albumin and innumerable hyaline, granular and coarse granular casts, and a moderate amount of pus. Patient was put on tinct. dig. m. xxx, t. i. d., milk and cereal diet, limited fluids and purgation.

Course.—On February 6, 1921, the patient was very restless and nervous, but no alternation was noted. Pulse 90, regular. Tendency to Cheyne-Stokes respiration.

February 9, 1921.—The urine was improved; specific gravity 1.004, albumin 2.5 per cent, fewer casts. He passed one quart of urine during the past twenty-four hours. Edema of extremities lessened. Pulse 84, no alternation; respiration normal. Patient went home on February 10, realizing the seriousness of his condition, but preferring to risk the trip. A letter was received on March 10, 1921, from his wife saying that he had continued to improve. He died on June 7, 1921.

This case is suggestive of the association of uremia with pulsus alternans which is emphasized particularly by French writers. Heitz[14] recalls that in 24 of his 25 cases of pulsus alternans there was uremia. He states:

"The alternation may be intermittent and is due to both the hypertension and uremic poisoning. By reducing the nitrogen in the diet, the toxic factor may be reduced. The restriction must be maintained until there is no longer any alternation. This treatment does not exclude the administration of digitalis and diuretics."

On the other hand, Chalier and Contamin[13] in 10 cases were unable to find any parallelism between pulsus alternans and uremia. This has been my experience in the few cases that have come under my observation. It was surprising to learn that this patient lived four months.

Case 4.—Hematuria, uremia, hypertension, cardiac dilatation, transient pulsus alternans.

Mrs. J. M., aged 52 years, was admitted to my service at Charity Hospital on April 11, 1921. She complained of failing vision and of having passed bloody urine for the past seven days. Three days ago she vomited dark blood. For several days she has been short of breath on exertion and has suffered from "kidney trouble" for the past twenty-five years. Six months ago she had a pulmonary hemorrhage. When a child she had typhoid fever and frequent attacks of malaria; pneumonia at 16 years; erysipelas at 25 years. She has two children and had puerperal fever with both labors.

Physical Examination.—Well nourished and developed. Face flushed, mucous membranes moderately cyanosed; pupils dilated but equal; reflexes exaggerated; no adenopathy. Temperature 97.5; pulse 72, respiration 20. Lungs: sibilant and sonorous rales throughout. Heart dilated, especially to left; heart sounds are weak at apex and there is a soft systolic blow accompanying the first sound; aortic second sound markedly accentuated. Radials sclerosed. Pulse regular (72), hard. Blood pressure: systolic 310, diastolic 170. Liver palpable and tender. Slight edema of feet. Urine was bright red, specific gravity 1.024, albumin two plus. Microscopic examination showed so many red blood cells that it was difficult to detect anything else. Wassermann reaction negative. White blood cells 8,900; hemoglobin 95 per cent; red blood cells 5,100,000.

Course.—April 19, in spite of the continued passing of bloody urine since her admission, the blood pressure was 284/190. Her vision was worse. She complained of severe headache and frequent attacks of nausea and vomiting. Venesection was performed and 500 c. c. of blood withdrawn.

April 29.—Patient very weak and unable to retain any nourishment; somnolent. Phenolsulphonephthalein test yielded less than 5 per cent in two hours. The blood pressure has steadily fallen. Pulsus alternans noted today. Systolic

blood pressure of strong beats 220, and of weak beats 210; diastolic pressure is 120, pulse 84 and regular. On the following day no alternation was found or subsequently. Patient died on May 8 in coma with Cheyne-Stokes respiration. The blood pressure two days previous to death was 208/106.

The only interesting feature of this case was the unusually high blood pressure and the efforts of Nature to relieve it by hemorrhages at different times from the lungs, stomach and urinary tract. It is remarkable that there was no cerebral hemorrhage.

Case 5.—Hypertension, arteriosclerosis, cerebral apoplexy, pulsus alternans.

Mr. G. P. L., 58 years of age, merchant, consulted me in May, 1920, because of pains in precordial region and left shoulder for the past five or six days. In August, 1919, retinal changes were discovered by his oculist. He stated a few months ago he had a slight stroke (according to his physician). During the past year he had suffered from frequent headaches. His past history revealed yellow fever at 12 years, black water fever 23 years ago; pneumonia 5 years ago; "flu" in 1918.

Physical Examination.—Well developed and nervous man; good panniculus. Face flushed; dilated venules on nose; no adenopathy. Lungs negative. Heart slightly enlarged to left; heart sounds normal except for marked accentuation of aortic second sound. Blood pressure 212/105. Pulse regular, 90. Radials sclerosed. Knee jerks exaggerated. Some paresis of left side of face and fauces; some difficulty in articulation. Patient not seen again until June 5, 1921. At this time his heart was dilated and sounds at apex were weak; aortic second sound accentuated. Pulse 96; no edema of lungs or extremities. Blood pressure 260/160. Blood Wassermann negative. Five urine examinations failed to show any albumin or casts and the specific gravity varied from 1.007 to 1.018. (The patient refused to permit any renal function tests or blood chemistry, probably influenced by his wife, who was a Christian Scientist.)

On July 11, 1921, alternation of the pulse was first noted. Systolic blood pressure of strong beats 215 and weak beats 205; diastolic pressure for both 120. Pulse 94, regular.

August 9, 1921.—Has been at absolute rest on salt poor, moderately low protein diet; no further headaches. Feels well. Blood pressure 220 115. No alternation found. He was seen again on November 5, when his blood pressure was found to be 240 130, but still no evidence of alternation.

SUMMARY

It is obvious that from so small a number of cases no deductions are possible, but I have been impressed by the fact that if blood pressure readings were performed more carefully, bearing in mind the possibility of the presence of pulsus alternans, this symptom would be far more frequently detected by physicians in general practice than it is at present. This has been my experience during the past year. Owing to the fact that many physicians take graphic records only of cases which show an irregular cardiac action, the presence of pulsus alternans frequently eludes them, for here the pulse may be regular with little or no acceleration. Furthermore, pulsus alternans may be very transient, rendering the taking of graphic records impractical in many instances. The careful use of the auscultatory blood pressure method in all cardio-renal cases, especially accompanied by hypertension, will be of great value in detecting this condition.

The error of confusing the regular occurrence of late extra-systoles (pulsus bigeminus) with alternation of the pulse is the chief pitfall. It may be impossible in a certain proportion of cases to differentiate positively between the two conditions without graphic records. According to White and Lunt[7], the error of confusing the pseudo-alternation with true alternation, using the auscultatory blood pressure method is about once in six times. It is possible that this error may be further reduced if we bear certain points in mind. (1) In pulsus alternans, in listening over the bend of the elbow at the time when all the beats are heard, the sounds are perfectly regular, whereas, according to Mackenzie,[8] in the case of pulsus bigeminus there is always a delay after the weaker. (2) In pulsus alternans, on auscultating the heart, it is extremely rare to note any difference in intensity of the strong and weaker beats, while in the case of regular premature contractions, the premature beats are apt to be less intense.

Undoubtedly errors will creep into any of the criminal blood pressure methods. But even admitting that a mistake may be made in one out of six times, this percentage is not so great as to rob it of value, and should act as a stimulus to check such observations by graphic tracings. The auscultatory blood pressure method will, in a few instances, detect a

slight alternation where tracings fail to reveal it. The delicacy of the method is demonstrated by the fact that an alternation of only 5 mm. of Hg can be detected. Furthermore, in two patients it was possible to recognize the diastolic pressure of the alternate strong and weak beats and thus determine their pulse pressure independently.

The importance of detecting pulsus alternans is very generally appreciated, but the gravity of the ill-omened symptom depends upon its persistence and association with other signs of cardio-renal insufficiency. Finally, its presence demands the removal of any exciting cause, as physical strain, infections, toxemias where possible, and is, in general, an indication for digitalis therapy.*

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DISCUSSION

Dr. Stewart R. Roberts, Atlanta, Ga.—Alternating pulse is one of the most interesting of the arrythmias. The impulse arises in the sino-auricular node as usual, and with each strong beat the heart pumps a normal amount of blood, whatever that amount may be. But with a weaker beat it pumps less blood with each beat. It would seem that the heart can do its normal work only at every other beat. It is, as Dr. Lyons intimated, not only of diagnostic but of serious prognostic import as well. It is a prophecy of an early dissolution, for, as a rule, a patient with alternating pulse does not live longer than two years. Much depends upon whether the alternation is periodic or permanent.

In general it occurs in cases of hypertrophy on the eve of decompensation. I have never seen a case of alternation of the pulse in a patient with hypotension or low blood pressure unless that low blood pressure was the aftermath of a high blood pressure and one of the symptoms of a failing myocardium. This is one of the arrythmias that cannot be diagnosed, as a rule, with the electro-cardiograph, and if we do not possess the instrument that is a comfort to us all. It is easily diagnosed by the polygraph. It can be diagnosed by the stethoscope, a good blood pressure instrument and careful attention. We can not make a diagnosis unless we first suspect pulsus alternans, and it is striking to note that Dr. Lyons reported last year one clean cut case of alternating pulse, and this year he has added five more. He was looking for alternation of the pulse inasmuch as his attention had been directed to it.

Another interesting matter he called attention to is the fact that the diastolic pressure after a large beat is lower than the diastolic pressure after a small beat. The reason, to my mind, is this: after a large beat twice the volume of blood is pumped into the aorta. There is greater oscillation of the peripheral arterial wall, the action is followed by a reaction in the contrary direction, and we get a lowered diastolic pressure. With the small beat the diastolic pressure is high because half of the volume of blood is pumped through and there is less oscillation and arterial dilatation. There is one irregularity in time which is usually suspected in the tracing he presents. There is a longer pause after a large beat than after a small beat. The contrary happens in the premature contraction, and this is one of the differential points without tracings. After the premature contraction there is a longer pause, particularly if the ectopic beat arises in the auricles, as a rule, than the ordinary pause between two heart beats.

I agree with Dr. Lyons fully that with a split aortic sound at times we can hear a split sound in the brachial artery. Some years ago I reported this condition in a study of the arterial sounds. We thought that this was the transmission of the aortic closure down the brachial artery to the elbow. Thomas Lewis investigated this matter and thinks it is due to the blood's rushing through the compressed brachial artery. In an aortic stenosis of marked degree the murmur may be transmitted down the brachial artery to the radial artery, and in a split aortic sound at times the split sound is heard in the brachial artery.

Dr. Frank A. Jones, Memphis, Tenn.—Pulsus alternans in these myocardial insufficiencies, myocardial scleroses, we all recognize as the truest index of a failing heart. There is a failure of conductivity, a failure of contractility, and a failure in the tonicity of the heart.

This is a 50-50 paper between the laboratory and clinical bedside findings. Pulsus alternans perhaps occurs more frequently than we suspect. I am inclined to think that these cases are most frequently seen in hospital practice. I see pulsus alternans not infrequently in my office.

In taking the blood pressure in cases of myocardial degeneration, particularly with renal

*Since this paper was read four additional cases of pulsus alternans have been observed; three of them transient types and one permanent. This brings the total number of cases found during the past twelve months up to nine (December 29, 1921).

arteriosclerosis, with cardiacsclerosis, you will find there is an erratic oscillation of the column of mercury at the time.

Dr. J. L. Green, Hot Springs, Ark.—This is sometimes an incident of a toxic state. All of us who take many blood pressure readings during the year will find times when in the hypertension case there is a relative irregularity in the force of the pulse. In my own office we use the mercury instrument exclusively, and my assistants as well as I are always on the lookout for the abnormal case. In a good many thousand patients concerning whom we have made records, cases of pulsus alternans are not frequent, and I think they are overlooked occasionally by a little fault in the technic. When the cuff is applied and the stethoscope used over the artery at the bend of the elbow, we pump up and observe the height of the pressure at which the pulse sound disappears and stop there. If it had been put up about ten more points pulsus alternans might have been detected that otherwise would have have been overlooked. The fact that it is of different degrees of intensity over the time in regular rhythm is but the forerunner of the time when we have missed beats, and they both mean a failing musculature.

Concerning a possible toxic state, I recall the case of a young woman, under thirty years of age, from a neighboring state, Louisiana. She came to Hot Springs to take a course of baths at the direction of her own physician in order that she might be relieved of some of the remaining pains of an acute articular infection, which was supposed to be incident to her tonsils. She had had a good tonsillectomy. The tonsillectomy wounds were scarcely healed when she came here and began taking baths under the direction of a negro attendant rather than a physician. After a fourth bath she had syncope in the bathhouse, and I was asked to see her. I found she had a true syncope. When she came to the office the following day a pulsus alternans was very plainly discernable. I noticed it the moment I put my finger on the radial pulse. It was a low tension case. The systolic pressure, I think, was about 116. She evidently had had a disturbance of the heart muscle due to a toxic condition, and when she had gone bathing in water that was too hot in a bad atmosphere she had syncope. We put her at rest and sent her home for ten days or more with instructions to take maximum doses of digitalis. When she returned at the end of sixteen days there was normal rhythm and the pulse beat was of equal force.

It was an interesting case in that it showed a myocardial change incident to rheumatic infection, yet the heart valve remained uninvolved.

Dr. Allan Eustis, New Orleans, La.—I have been much interested in this subject since 1911, when I stumbled on the fact incidentally while trying to demonstrate the technic of taking blood pressure to undergraduate students, one of whom called my attention to it. He said, "I find the beats going through at 170, but they do not become regular until 150." From that time on I began to keep records of these cases. I kept records of these cases for five years before I realized that they were really a condition of pulsus alternans. Some of you may recall that I mentioned this in discussing Dr. Christian's paper last year. This method has been of signal benefit to me in prognostic work, that is, in cautioning patients not to overexert the heart.

I shall bring this home to you by citing one case. A man came to me for physical examination because his wife thought he was working too hard. He had no symptoms nor signs. His pulse was normal. The only thing abnormal was that he had a systolic pressure of 190 with a variation down to 170. I had seen a sufficient number of such cases to realize that it was a condition of a weakened myocardium. I cautioned this man to put on the brakes, to stop working so hard, which he refused to do. He developed in six months a systolic murmur at the apex with definite symptoms of mitral insufficiency. He was put to bed and kept there for two months. Dr. Elliott agreed that it was a case of dilatation of the heart. Since then he has been able to regulate his life and today his heart is normal.

I disagree with Dr. Jones that when we find pulsus alternans we are ready to sign a death certificate. On the contrary, we are ready to caution our patients. Too many of us overlook these little signs. We should not be afraid to warn our patients when the heart muscle is becoming weak.

If we take anything home from Dr. Lyons' paper, it is to keep careful records of such cases and watch them in future years. I have been doing this for a period of ten years, and I have some interesting data to give at a later date. Many of my cases have shown definite myocardial insufficiency.

I have not seen or heard of alternating diastolic pressure spoken of by Dr. Lyons. I do not know how many records I have, but I suppose they run into the hundreds. Pulsus alternans is a far more frequent condition in my hospital work than in my private practice.

Dr. G. Canby Robinson, Baltimore, Md.—I agree very heartily with Dr. Lyons' recommendation that we should follow carefully the first appearance of sounds when measuring the blood pressure, and I have very often been able to detect alternation in the pulse by this means. I have always considered it a serious prognostic sign.

A point of special interest that is still being discussed very definitely, is why the heart alternates. There is one explanation of it that must be true, and that is, the ventricular contractions are first strong, then weak. But the point under discussion is, do the contractions involve the whole muscle? Is there a strong contraction, then a weak one, or is it a partial contraction of the myocardium when the weak beat appears? There has been some recent experimental work to indicate that the alternating weak beat is probably a contraction in which all the muscle fibers of the ventricle do not take part. At any rate, it is a disturbance of muscular contraction which, after all, is the essential factor in the cardiac activity that maintains the circulation. Therefore, we have in alternation definite evidence that the most important function of the heart, namely, contraction, is abnormal and has been damaged.

Dr. John A. Witherspoon, Nashville, Tenn.—Will Dr. Lyons explain from his observation of pulsus alternans where he gets one full bounding systole, then a weak one? What difference is there? I have observed, as he says, that it is usually significant of myocardial degeneration or is a pulse of danger. In a number of cases which we see so often in neurotics and in gastric cases, where we have several strong beats and then several weak ones, there is nothing so significant of danger as these alternating beats. I have noticed that in several instances. I have seen a number of cases where we had several beats (four or five) of strong volume, then a weak pulse not equal to the other. I have never seen that attended with the danger that I have noted in these varying pulses.

Those who are practicing general medicine should recall that there are very few blood pressure instruments that are accurate after being used a short time. They get out of order and are difficult to keep in good condition. You cannot make a test so delicate as Dr. Lyons spoke of. The mercury instrument is the only one to depend upon according to my observation, and I doubt the value of relying upon so many different things in taking diastolic and systolic pressures, because these instruments are not always kept in good condition.

In myocardial degenerations possibly Dr. Robinson's explanation is right, that the other ventricular muscle is not involved in this condition. If that be true, is it due to faulty condition of nerve impulse, or does the sino-auricular node, which is sending out the impulse, vary? Or is it evidence of myocardial weakness? These are difficult problems. How can one part of a muscle contract without the use of the other? And if so, under what influence does that occur?

Dr. Lyons (closing).—My purpose in bringing this paper before you was simply to bring out the point that by the ordinary clinical methods we are able to detect this condition if we are on the lookout for it. This has been my own experience, so that I am in the same boat as those of you who have not found it. The recent literature shows that cardiologists who make routine tracings of all heart cases find many instances of pulsus alternans. For instance, Dr. Pratt, of Boston, reported having had 70 cardio-renal cases traced by graphic records without selection and of this number he found 8 cases of pulsus alternans. White thinks it is as common as auricular fibrillation. Gravier believes that alternation is a frequent symptom of cardiac insufficiency. One of the reasons why clinicians find pulsus alternans comparatively rare is that, although they may possess a sphygmograph they do not take tracings unless the pulse is irregular. Unfortunately where pulsus alternans exists the pulse is frequently regular. The clinician takes the blood pressure, but he is not looking for pulsus alternans, consequently is apt to overlook its presence here.

In regard to the diastolic pressure of the weaker beat where you get alternation in the pulse, the reason Dr. Eustis did not find it is that he had the same trouble I had. I heard it, but did not recognize it.

The explanation of Dr. Roberts may be correct as to why the diastolic pressure of the weaker beat is higher than that of the stronger beat.

I do not think Dr. Jones and Dr. Eustis are far apart in regard to the prognosis of these cases. It depends upon what you are speaking about. These five cases and one other I saw three years ago were of the transient type with the exception of this particular one. The outlook of permanent alternation of the pulse must be a great deal more serious than in the transient type. For instance, in transient types due to heart strain plus infection or toxemia, the removal of the infection or toxic factor combined with rest may be sufficient to restore the function of contractility. For example, in Case 2 we found that the removal of the toxic factor was enough to rid her of the alternation.

The only case that I have seen with anything like normal blood pressure was observed three years ago. This man had a systolic pressure of 150. He had myocardial degeneration and arteriosclerosis and was working very hard. He suffered from some dyspnea and precordial pains. When put at rest, the angina and alternation disappeared and the patient is now living after a period of three years.

I am sorry I cannot answer Dr. Witherspoon's question because I do not understand it. He may have described a transient alternation. Transient alternations are found after attacks of paroxysmal tachycardia. There is a mechanical exhaustion of the heart muscle due to rapid action, and when that stops the outlook is very good.

OBSERVATIONS ON THE USE OF THE COPPER FILTER IN THE ROENTGEN TREATMENT OF DEEP-SEATED MALIGNANCIES*

By Thos. A. Groover, M.D.,
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and
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The substitution of the single massive dose for the repeated fractional dose method in the roentgen treatment of superficial malignancies marked a distinct advance in the treatment of these lesions. Such lesions can be destroyed by a single dose, with every prospect of a permanent cure, provided they are in fact superficial; are strictly localized; and are accessible. This method of dealing with such

*Read in Section on Radiology, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

lesions compares very favorably with other forms of treatment.

For several years the efforts of roentgenologists have been directed toward the application of the same general principle in the treatment of malignancies more or less remote from the surface of the body. With this end in view, cross firing was developed, and voltages and filtration have both been increased. For a number of years a parallel spark length of 8 or 9 inches; filtration with from 2 to 6 millimeters of aluminum, and cross-firing through a variable number of portals was looked upon as a more or less standard method of attack, and was the one employed by us prior to the adoption of the technic forming the subject of this communication. Usually these seances have been repeated at intervals of from three to six weeks for a variable period of time. To call such treatment "intensive" or "massive" is correct only in a relative sense. As a matter of fact the effect of such treatment on cancer several centimeters below the surface is quite comparable to the old fractional dose method of treating superficial lesions. It is comparable not only as to the relative amount of radiation delivered to or absorbed by a given cell in a given time, but also from the standpoint of clinical results, due regard of course being given to the great variation in the malignancy of different tumors.

It is not our purpose at this time to discuss the value of treatment in accordance with this technic, but that it is wholly inadequate in greatly modifying the mortality from deep-seated malignancy will be admitted by all unbiased observers who have had much experience in its use. While there are no available statistics on the subject, it is certain that the percentage of cures of deep-seated cancer that can be accredited to roentgen therapy alone is very small. It is recognized that its independent use has been restricted almost entirely to the most unfavorable cases, but in spite of this fact, the results are in marked contrast to the high percentage of cures that can be obtained in superficial cancers by a single massive dose, and but emphasize the necessity of further efforts to enable us to deliver a knock-out blow to the lesion within the body as readily and efficiently as we do to those on the surface.

Recognizing this fact, we became much interested in certain laudable reports from foreign sources incident to modifications in technic which were heralded in this country about a year ago. These reports indicated the use of higher voltages than were being used by American roentgenologists; the substitution of other metals for the customary aluminum filter; an increase in the skin-focus distance; a reduction in the number of portals of entry; and a great increase in the time of exposure for a given area. One advantage of such a modification, if indeed there is an advantage, is predicated upon the assumption that a greater amount of secondary radiation would take place within the body, and that these secondary or scattered rays would greatly increase the depth dose.

In an attempt to approximate the technic, as we understood it, we adopted the following standard, which has been adhered to with only slight modifications from time to time to meet what were considered to be the indications of some particular case:

Spark gap measured between blunt points $8\frac{1}{2}$ to $9\frac{1}{2}$ inches.

Milliamperes, 5.

Filtration, 0.5 millimeter of copper under which was placed 1 millimeter of aluminum.

Skin-focus, 12 inches.

Time of exposure for each area, 3 hours.

The treatments have been given with three different machines, all of different make, with so far as can be observed no difference in result. Since we were restricted by the capacity of the apparatus available there was no increase in voltage over that previously employed.

The number of areas treated has varied from one to four, thus making the exposure time vary from three to twelve hours. Not more than two hours' treatment has been given in a single day, and as a rule not more than one hour daily or on alternate days. In only a few instances has the series been repeated. In

certain locations an exposure time of two hours at a skin-focus distance of ten inches has been given rather than the customary three hours at 12 inches. We have found that more than one or two hours' treatment daily is too fatiguing for the average patient.

Roentgen sickness during such a course of treatment is often quite severe, but we are not convinced that it is more so than with the older method. The fact, however, that it is extended over a much longer period, sometimes renders it difficult to persuade the patient to complete the series. The degree of sickness is very variable. Some patients have not been made sick by six or more hours' treatment, and one patient was made quite sick on the first day, but remained unaffected by subsequent treatment.

The effect on the skin has varied from an intense bronzing, with subsequent desquamation, to a considerable amount of vesication over the entire surface exposed. We believe that hot weather has been the determining factor in the cases in which vesication has occurred to any great extent. The thickness of the part may also explain certain variations in the degree of skin reaction when opposite points of the body surface have been exposed. In cases in which vesication has occurred the promptness with which healing has taken place has been quite noteworthy. In no case has it required longer than four weeks to disappear, leaving the skin smooth, soft and pliable.

In this connection it may be well to point out that the "skin dose" or "erythema dose" is one that may have a very indefinite meaning. One hour's treatment by the technic under discussion will cause a definite erythema, and yet exposure for two additional hours will be readily tolerated without serious damage. Cases have not been observed for a sufficient length of time to determine the possibility of late skin changes.

If the treatment is administered about the neck or upper thorax, difficulty in swallowing frequently occurs. Its appearance is coincident with the skin reaction, and it has also subsided with the skin reaction, except in two instances which will be referred to later. The act of swallowing is not particularly painful, but the difficulty in getting food, particularly solids, to go down may occasion some apprehension. The salivary secretion is greatly lessened and the saliva becomes thickened and tenacious if the salivary glands come within the irradiated field. Huskiness of the voice may also occur. In two cases of cancer of the tongue in which the neck was given a maximum amount of x-radiation, together with radium in the tongue, a peculiar brawny induration of the tissues of the neck has supervened. The tissues on palpation had a myxedematous feel, and swallowing became increasingly difficult. It is not known whether these phenomena have been due to metastasis or whether the radiation has been wholly or in part responsible.

In a considerable number of cancers of the breast which have been treated by this method, an irritative unproductive cough has developed at or about the time of appearance of the skin reaction. Shortly afterward certain pulmonary changes have been demonstrable in the roentgenogram in cases which have previously shown no evidence of intra-thoracic pathology. These changes begin as an infiltration at or near the hilus which spreads quite rapidly and in the course of three or four weeks may involve practically the entire lung. Coincident with the spread there is a certain amount of dyspnea. The roentgen appearance of the lung lesion at certain stages is strikingly like that seen in influenzal pneumonia. In at least one case the infiltration after rapidly reaching a maximum has been observed to undergo a definite regression, and to assume a more fibrotic appearance. The natural assumption would be that these pulmonary phenomena are due to metastasis, but certain clinical observations have led us to consider seriously the possibility of their being caused by the treatment instead. Certainly if they are due to metastasis, their production and rapid spread are directly related to the treatment, as their behavior is altogether different from the lung metastases observed in untreated cases. The physical

well-being of some of these cases is far better than would be expected in patients with extensive metastatic malignancy. Some have actually gained in weight and except for slight dyspnea on exertion consider themselves in good health.

It is at once apparent that it is of vital importance to determine the significance of these pulmonary phenomena. If they are due to cancer metastasis it seems reasonably certain that the treatment is a factor in their development, and if due to the treatment, independent of metastasis, they become of very great therapeutic significance.

A number of cases of uterine cancer has been treated usually in conjunction with the intra-vaginal or intra-uterine application of radium. In some of these diarrhea has occurred which has lasted in some instances for two or three weeks. In one case the stools contained blood for several days. It may be stated that this particular case, which was one of recurrent cancer in the vaginal vault following hysterectomy, is now in good condition after a lapse of six months. It is suggested that treatment of these cases in the Trendelenburg position may aid in obviating damage to the intestine and also perhaps render the treatment more effective by allowing some of the bowel to gravitate away from the field of radiation. It has also occurred to us that it would be possible to deliver considerable radiation to the pelvic structures by treating through the perineum, and with this idea in view we have constructed a piece of apparatus resembling a commode on which the patient sits while the treatment is being administered.

In a case of cancer of the cecum which was treated, the patient developed an attack of uremia a day or two following completion of the series, which, however, did not prove fatal. It is known that prior to the treatment the urine was normal, and it may be that the treatment was responsible for the uremic attack.

In attempting to summarize the injurious effects which can with any reason be attributed to the treatment itself, it may be stated that while certain potential dangers are recognized, we are convinced that they are not prohibitive, unless it be developed by further observation that the treatment is a factor in the development and spread of metastatic foci deep within the body.

It is also obvious that any therapeutic measure must be of definite benefit and superiority to justify its continued use and the technic under discussion is no exception to that rule.

In discussing this phase of the subject it is manifestly improper to claim or even suggest the cure of a single cancer that has been under observation for a year or less. We are able, therefore, only to call attention to the obvious effects of the treatment on tumor masses, and in a general way compare the results with those obtained by the older technic.

The technic has been used in seventy-five cases. With the exception of eight cases in which the treatment was given soon after operation, and two borderline cases, all were hopeless from a surgical standpoint. A majority of the cases were post-operative recurrences. Thirty-eight of the seventy-five cases were cancers of the breast; ten, cancers of the uterus; and the remaining twenty-seven were variously distributed throughout the body.

In general it may be stated that the effect of the treatment on the tumor masses has been far more striking and consistent than we had ever before observed with the older technic. In cancer of the breast, for instance, we have repeatedly seen large tumors, both primary and recurrent, with axillary and cervical metastases, completely disappear so that no local evidence of disease could be detected by the most careful physical examination. This occurs within six or eight weeks after treatment.

As might be expected in a series of cases which were wholly unfavorable from every standpoint, some have finally succumbed, and it is quite certain that many of those still living will finally die from cancer. The fact remains, however, that the treatment will in many cases cause a complete disappearance of all local evidence of disease, and naturally raises the question as to what might be accomplished in a series of more favor-

able cases. We are of the opinion that the time is not far distant when a readjustment will be necessary with respect to the relative places of radiotherapy and surgery in the treatment of malignant disease. We consider it not improbable that the present status of surgery and radiotherapy, particularly as they relate to cancer of the breast, may in the final readjustment change places, so that the former may come to be regarded as the adjunct of the latter. This has already occurred to a large extent with respect to the treatment of cancer of the cervix uteri, and with improvement in technic will doubtless be extended to other fields.

As has been pointed out in a previous paper,[1] the best that can be expected in the treatment of cancer of the breast by the most radical and efficient surgery is a cure of one out of every four cases, and this only applies to carefully selected cases. Where the limits of operability are less rigidly adhered to, the percentage of cures is very greatly diminished.

Without again going into the pros and cons of pre-operative and post-operative radiotherapy in cancer of the breast, we should at present be disposed to recommend primarily a single series of roentgen treatment in accordance with a technic not less intensive than is herein set forth, and defer the question of surgical intervention for a period of approximately two months.

We believe that by pursuing such a course the following advantages would accrue:

(1) The actual volume of cancer tissue would be greatly lessened and would in some cases disappear entirely so far as could be determined by physical examination.

(2) The danger of cancer dissemination incident to surgical trauma would be lessened.

(3) A number of inoperable and borderline cases would become definitely operable.

It is realized that the danger of operative delay in malignant disease is so thoroughly ingrained in the medical mind that the course proposed will meet with general disapproval, but we believe that a more intimate knowledge of what can be accomplished by efficient radiotherapy will result in a changed point of view.

Perhaps the chief danger of such a course would be the fact that the obvious decrease or disappearance of tumor tissue would lead to a false sense of security, and engender a hope that the subsequent course of the disease would not justify. However, in a disease in which the results of present methods of treatment are anything but brilliant, it would seem justifiable to try out on an extensive scale a procedure which is not only logical in theory, but is also supported by many well established facts.

Discussion follows paper of Dr. Ernst, page 155.

(1) Groover, Christie and Merritt: The Present Status of Roentgen and Radium Treatment of Cancer of the Breast. Journal of Radiology, September, 1921.

EUROPEAN IMPRESSIONS AND PERSONAL EXPERIENCE IN THE USE OF HIGH VOLTAGE X-RAYS IN DEEP-SEATED MALIGNANCY*

By Robert H. Millwee, M.D.,
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It is not the purpose of this paper to give a detailed account of my observations of deep roentgen therapy in Germany. Complete reports of the observations of Schmitz, Stern, Sittenfield, Stewart, and other American writers have already been published. But I shall attempt to give a very brief statement of those points in the use of high voltage x-rays as practiced in European clinics which I believe are of greatest importance.

A visit was made to Opitz and Friedrich Clinic in Freiburg, Baum's and other gynecological clinics of Berlin, and Sitz and Wintz of Erlangen. The general technic in use in all these clinics did not differ materially. With the various workers there seemed to be little difference of opinion as regards general principles of the application of roentgen and radium

*Read in the Section on Radiology, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Arkansas, November 14-17, 1921.

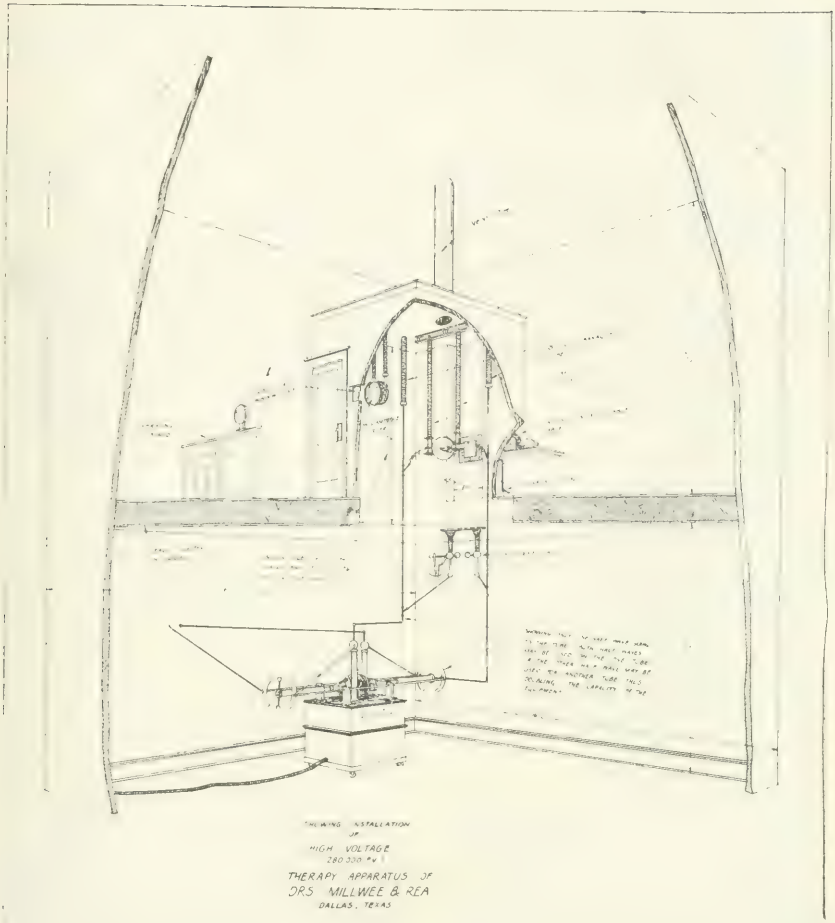

Fig. 1.—Showing high-voltage x-ray apparatus installed on afloor below the treatment room, the x-ray tube in a booth on the floor above. By this method the x-rays reach the patient by passing through a hole in the wall of the booth. This booth is lined with heavy lead in order to prevent stray or scattered rays reaching the patient or the operator. Patients treated by this method are safe from electrical shock. They are not bothered by the great noise of the transformer or the sight of strange apparatus. It is found that most patients will assume a position for taking the ray from the side with greater comfort than if the tube is placed above them as has been the custom in the past.

ray to the treatment of deep seated malignancy.

(1) Voltage of 220,000 peak volts was used. Radium was usually used in connection with x-rays.

(2) All believed that the action of the rays on cancer cells was a direct one.

(3) That the advantage gained by the employment of x-rays of high voltage (220,000) is that of better dosage to deep seated lesions without permanent damage to essential normal structures.

(4) They were unanimous in their approval of the accurate measurement of dosage by the ionization process, and all workers used the method in some form.

(5) Heavy filters of from ½ to 1 mm. of copper, or its equivalent, were used in all clinics.

(6) The determination of proper dosage for various types of tissue was considered seriously by all, and the various workers differed but little on this point.

The dose table of Sitz and Wintz follows:

An amount of ray sufficient to cause the skin to turn red in 8 or 10 days, and brown in 2 weeks, is termed a U. S. D. or Unit Skin Dose and is given as 100.

Skin erythema, 100.
Carcinoma, 90 to 110%.
Sarcoma, 70%.
Muscle, 180%.
Mucosa of rectum, 135%.
Sterilization, 35%.

It was generally admitted that in some cases the proper dose of ray for the destruction of carcinoma cells does not depend so much upon the histological picture of the malignancy as upon the general condition of the patient.

CLINICAL RESULTS

The various workers visited were enthusiastic as to the results being obtained. The percentage of reported cures were better in some clinics than in others, Sitz and Wintz making probably the most flattering report, which gives about 80% cures of all malignancies.

Walter Friedrich states he has employed his present technic since 1918 with great success as nearly as can be determined at this time. I was shown many cases which exhibited every evidence of having been malignant, but which seemed to be free from disease at the end of the third year.

PERSONAL EXPERIENCE

As yet it is too early to talk of permanent cures in my own work. But a description of my technic and a brief consideration of some of the more important biological problems to be considered in its application will be given, with a report of two cases.

The following technic is used for malignancy in the pelvis:

Voltage, 230,000 peak volts measured with sphere gap.
Filter, ½ mm. copper and 1 mm. aluminum, 10 mm. sole leather.
Skin target distance, 24 inches.
Ma. 4.

A good erythema is reached in 2 hours or 8 ma. hours. I have given as high as 10½ ma. hours and secured only a slightly greater erythema, and I have also gotten a slight erythema in 4 ma. hours.

Ionization method is used for measuring dosage. Four fields are used, one in front, one behind, and one on either side, no field being smaller than 5 inches in diameter. About 1800 milligram hours of radium are administered in the cervix or uterus, as the case may be. A 30 inch skin target distance is used for extra heavy patients. For breast cancer a 40 inch skin target distance is used, other factors being the same as for pelvic cases except that only one large field is used.

These same general principles of high voltage, heavy filter, and massive dosage are employed in all cases of malignancy situated below the surface of the skin.

A total of 118 patients have been treated by this method. Many were very hopeless cases and practically all were advanced inoperable cases. No patient so treated has died either from the treatment or the disease. A few cases are seemingly unchanged. However, 90% of all cases treated have shown most marked improvement. Often large malignant masses pass away within a few weeks and patients show every indication of recovery.

Case 1.—Woman, 52 years of age, with typical history of malignant uterus. Exploratory incision was done and surgeon reported malignant uterus with large mass in left broad ligament and a metastasis to rectum. After several blood transfusions patient was given erythema dose to all tissues in pelvis. Patient returned in three months, had gained 27 pounds, no pain, normal blood picture, eats and sleeps well, and feels better than she has felt for past ten years. Examination of pelvic organs is without pain and reveals nothing abnormal. Apparently the patient is well.

Case 2.—Mrs. W., 63 years of age, malignant breast of three years standing. The entire breast seemed to be involved and was enlarged to twice the size of the other breast, very much inflamed and very hard. The nipple was entirely gone, and an ulcerating crater, 2 inches in diameter, occupied the site of the nipple. There was marked

glandular involvement in the axilla of that side, and patient had suffered great pain for several months. Her general condition was fair. Massive dose of x-ray was given and she was in bed for ten days from effects of treatment. Condition rapidly improved. At the end of four months the glandular involvement had disappeared, the breast was reduced to less than the size of the normal breast, and ulcerating surface had healed. Patient has no pain and seems well.

REASON FOR MASSIVE DOSE

Massive doses are given and the entire dose is given at one sitting, if the condition of the patient will permit, with the object of giving sufficient dosage to the malignant tissue to destroy it before a tolerance might be developed for the radiation. Only patients in good physical condition with a blood count of over four million reds and 70% hemoglobin have been given the dose at one sitting. This precaution is observed because the heavy radiation does have a destructive action on the blood cells. Cases have been observed in which two and one-half million reds and half the whites disappeared as a result of a single massive dose. Fortunately, however, the blood returns to about normal within a day or two. Patients with two or three million reds and hemoglobin to correspond are given the dose in broken doses which may be scattered out over four or five days.

The blood should serve as index to the rapidity with which a massive dose may be given provided acute infection can be excluded, though I have given massive doses without harmful results to patients showing considerable acute infection.

It is just as reasonable that a malignant cell will develop a tolerance for x-ray or radium rays as it is that the cells of a tender plant or man's skin will develop a resistance to the rays of the sun, and, if this be true, then it is very important in treating malignancy to apply the dose as rapidly as possible.

It is also an established fact that small doses of radiation stimulate malignant cells to more rapid growth instead of destroying them. This is a very good reason for giving as large a dose as the normal tissues will tolerate.

We have at our disposal in high voltage x-ray a much larger quantity of a very penetrating ray than is possible to secure from even a large quantity of radium. Hence the physical problem of delivering sufficient dose to a large mass of tissue to all malignant cells is practically solved.

BLOOD CHANGES

Blood changes of heavy radiation are more marked than by small doses. Both the red and white cells are destroyed in large numbers, probably by direct action of the rays as the blood circulates through the part being rayed. This change is probably not dangerous as the blood returns to about normal within a short time after the radiation is discontinued. However, it is well to watch the blood picture very closely during radiation. Several months after radiation patients usually show a slightly low white count which is probably the result of the radiation which the lymphoid tissue receives.

TOXEMIA AND OTHER EFFECTS OF MASSIVE DOSES

In my own work the toxic symptoms have not been so marked as when I attempted to give a massive dose with low voltage. Nor are the patients so toxic as those observed in European clinics. This lessened degree of toxemia is probably the result of elimination of all gases, noise, and other nerve racking elements from the room in which the patient is treated. (See Fig. 1.)

When pelvic cases are treated some few show symptoms of bladder irritation and a diarrhea is not uncommon, which symptoms disappear in ten days. The diarrhea is probably due to irritation of intestinal mucosa, though the element of neurosis may be a factor.

I have not followed the technic of any particular European worker, nor do I recommend that any one adopt my method in detail. I am inclined to make some changes from time to time, and particularly to use heavier filters.

Though it cannot be said that most cancer is cured by x-ray treatment, it is to be hoped that the future will prove that ray therapy as it now stands is on the right path.

Discussion follows paper of Dr. Ernst, page 155.

THE PRACTICAL STATUS OF DEEP THERAPY WITH THE ADVENT OF HIGHER X-RAY INTENSITIES*

By Edwin C. Ernst, M.D.,
St. Louis, Mo.

After carefully analyzing and dissecting our experiences with the present more intensive x-ray radiations, we cannot help realizing the many limitations which present themselves in so vast and unexplored a field of therapy. We have had a very limited experience in the practical application of these newer methods of combating malignancy.

The important physical factors in our technic, with special reference to the character and quality of x-rays employed, remained more or less constant during the past ten months, and for that reason we were better able to judge the comparative values of the more intensive characteristic rays. The quantity of such rays administered in our treatments was the only variable factor, and consequently increased or decreased to meet the individual pathological requirements.

In view of the discussions just concluded with reference to the many detailed phases of this newer field of therapy, taking into consideration the extensive work of our colleagues abroad and the valuable studies of workers in our own country, a repetition of all the clinical and therapeutic factors would be superfluous at this time.

I am desirous of presenting the practical status of deep therapy as experienced by us in our daily routine and include in this discussion our many shortcomings, unfavorable results, etc., as well as the immediate more favorable clinical changes.

With the advent of this present new era in x-ray therapy stimulated by the large amount of scientific work accomplished in similar fields abroad, the first realization must be that such radical changes in therapy technic should necessarily be accompanied by equally radical changes in the physical and electrical methods of producing such radiations. The method of transforming electrical energy into radiation energy has been and will continue to be our basic paramount problem, and must first of all be practically solved to meet the present maximum high tension requirements.

In view of the many recent and rapid advances in radiology and the publishing of such a variety of x-ray technics, both abroad and on this side of the Atlantic, there is grave danger of misinterpreting the many complicated descriptions and methods of treating malignant tumor pathology. The methods of electrical transformation abroad are in many instances radically different from those employed by us in America.

Last week I observed two radiologists working in different laboratories apparently attempting to duplicate technics described by continental investigators. The filtration was one millimeter of copper. The focal skin distance varied between 65 and 70 centimeters in the one hospital, while the other radiologist employed a minimum of 85 centimeters anode skin distance. The transformer potential never exceeded 120,000 volts (sphere-gap measurements) and the total quantity of radiation through a single skin area never exceeded 225 milliampere minutes. All of these treatments were administered through two skin areas for deep-seated malignant pathology.

Certainly no one here would think seriously of following such a method without realizing the fact that by increasing both the filtration and the focal skin distance, and this without a compensatory increase in either the time (total quantity of radiation), or the voltage of the transformer, that such a treatment could not be effective in the deeper malignant lesions. It is a physical fact that a tumor ten centimeters beneath the skin surface, under the above conditions, could receive only 1/20 of the required quantity of radiation considered to be a lethal cancer dose.

There are so many factors to be constantly kept in mind that it behooves all of us to take our bearings repeatedly as to whether or not we are actually pro-

*Read before the Radiological Section, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

ducing a lethal dose to the deeper pathological cell structures. Comparative quantitative and qualitative measurements of the skin and depth dose are most essential.

Dr. Holmes made a significant statement in the September number of the *American Journal of Roentgenology* of this year (1921) as follows:

"In 1907, the American Roentgen Ray Society published in book form the proceedings of their annual meeting by Pfahler, Pancoast, Johnston, Williams and others, giving the results obtained and the technic used in the treatment of carcinoma, sarcoma (the so-called blood disease) and the disease of the ductless glands. The results which were recorded in their papers compare quite favorably with those being obtained today, but has there been any great change in the method of application other than that which would naturally come with improvement of apparatus? Why has the radiotherapeutist failed to keep step with his co-workers, the physicist and biologist? Surely it is not because of lack of material, but rather I think because these men who from their knowledge and experience could have advanced the science have been overwhelmed with routine work, and have not been able to surround themselves with student workers who could carry out their ideas, as have the advanced workers in other fields."

Many of us may not agree with all of his conclusions, yet we must admit the timeliness of these significant remarks, and allow them to be a stimulus in our future work and to be ever more exacting in our daily therapy problems and thus realize compensatory better results. Perhaps the present advances in radiotherapy may be the beginning of a new era, following a more earnest cooperation of the physicist, biologist and radiologist. Therefore, the sooner we more carefully consider the object of radiotherapy, the biological and therapeutic effects and the proper selection of the physical factors constituting the effective radiation dose, the more nearly standardized will be our technics and the more permanent our results.

Let us, therefore, consider the object of radiotherapy, which primarily is either to destroy the malignant growth en masse and prevent further or continued dissemination, or secondly, in the hopeless inoperable cases to merely make the patient more comfortable; while the object of radiotherapy in the third class of cases is to render a hopelessly inoperable case operable.

In order to accomplish the maximum benefit upon these rapidly growing structures, we must clearly understand the supposed effect of radiation upon the normal and pathological tissues. This phase of therapy has been discussed at considerable length by Dr. Greenbough before the International Society of Surgeons, and he sums up his conclusions of the biological and therapeutic effects to be expected from the treatment with x-ray and radium as follows: (1) living tissues may be destroyed en masse; (2) growth may be temporarily inhibited; (3) the manner of the growth may be modified; and (4) the rapidity of the growth may be stimulated. He further states that in the terms of these four phenomena we must consider the action of radiation in the treatment of disease. However, in addition we must not lose sight of the not infrequent relative immunity stimulated by cell destruction and likewise the effect of stimulating the tissues surrounding the tumor pathology, especially connective tissue, which may influence such pathology by shutting off its blood supply.

The next essential factor for all of us to consider more carefully is the matter of the radiation dose, with reference to the amount the patient has received and his reaction as well as the amount supposedly absorbed by the local tissues. The absorption is dependent largely upon certain factors, namely: (1) the intensity of the radiation; (2) its quality; (3) the duration of the exposure; (4) the area exposed; and (5) the kind of tissues receiving such radiation. These factors may be further sub-divided and enumerated so that duplication of the radiation is a practical possibility. Therefore, it is desirable to enumerate the following physical factors in every treatment given from the standpoint of the unfiltered x-ray dose:

(1) The voltage applied to the tube and the means used for exciting such a tube.
(2) The type of the tube.
(3) The current through such a tube.
(4) The focal skin distance.
(5) The duration of the exposure.
(6) The size of the area exposed.

I am sure that we have all considered many of these factors in our routine ther-

apy work, but have we given them all the attention they deserve and checked our potentials and methods of administration from time to time?

In view of the stupendous problem before us should we not choose to practice radiotherapy by thus carefully considering each and every one of the above essential biological and physical factors? Such a procedure is not unlike the many steps a surgeon must always consider previous to operation ere he eradicates a similar disease with the knife. The carcinoma growth spreads by means of the lymphatic channels. Every precaution must be taken to block off the danger of metastasis by complete obliteration of these avenues. If the anatomical course of these lymphatics be thoroughly understood, since we know that these tissues respond more readily to radiotherapy than the surrounding normal tissues, the destruction may be skillfully accomplished without danger to the superimposed normal structures. The skill of the radiotherapeutist, therefore, depends upon the efficient selection and application of a known quality and quantity of radiation energy to the diseased tissue, destroying it en masse if necessary, blocking off all adjacent communicating lymphatic structures, but without doing serious damage to other vital tissues. This method of treatment is certainly closely associated with standardized operative technic in surgery, and for no less a reason such a realization should stimulate us all to use every method both electrical and physical to employ the x-ray, destroying or conserving, respectively, the pathological or normal tissues, with the same precision as the surgeon uses the knife along practical and scientific lines. As a result recurrences in radiotherapy in properly selected cases will be reduced to a minimum. Let us not worry too much about the multiplicity of methods described abroad, since the apparatus employed by our continental therapeutists differ so widely from those we are using at the present time. At least it has been extremely difficult accurately to compare voltage equivalents between the transformers abroad and those employed in America.

Let us profit by their wonderfully scientific studies with special reference to ionization chamber method of measurements, the studies with reference to the relationship of the superficial skin dose to the necessary depth dose, the individual values of the various sized filters, the most practical focal skin distance with given filters and approximate voltages and the direct relation of the size of the area to the total amount of radiation absorbed by the tissues, etc.

If, for any reason, we desire to modify any of the above physical factors, such as the skin anode distance, filters, type of apparatus, let us check our work on a physical basis and be absolutely certain that the tissues are receiving the effective lethal dose. For example, if we increase our filtration beyond a half to three-quarters of a millimeter of copper without increasing the voltage output of the majority of our transformers which are practically limited to 140,000 volts, sphere gap measurements, we may be underraying our patients. And if, on the other hand, we increase our distance at the same time, as we previously explained some radiologists were doing, perhaps the compensatory time factor would be increased beyond all normal practical limits.

Let us consider the many problems constantly presenting themselves with the use of these more intensive x-ray radiations; the value of the increased focal distance, the replacing of aluminum with copper filtration; the use of larger areas for a longer period of time, and their relation to both the tumor pathology and the local normal superimposed and surrounding tissues, and the reaction of the patients themselves to such radiations.

Throughout our work during the past ten months all of our physical factors remained constant with the exception of the time factor. This is an essential and practical point to remember. During the past two months we have occasionally increased our potential through the tube from 140,000 to 152,000 volts (sphere-gap measurement). We are hoping to adopt this more intensive potential as standard. In checking up our transformers, meters, overhead wiring systems, we frequently

found important variations in our readings. In one instance at a hospital the current was found grounding itself to the wall, and in another shorting through a wooden high tension switch. All of our transformers are of the same manufacture, yet they vary in potential under certain settings of the disc. These are checked repeatedly, nevertheless we found variations in many instances from week to week. Our meter readings gave no apparent evidence that the patients were not receiving the proper full voltage dose, yet sphere-gap measurements did show a reduction in the voltage and the iontometer readings, a reduction far below 23 per cent at 10 cm. depth beneath the skin. In one instance there was an approximate loss of 15,000 volts, which we believe was sufficient to underray a deep-seated malignant lesion and be a deciding factor between success and failure. In other words, our experience has led us to believe, and this has been partly corroborated by the research work of many physicists, that with the following definite given factors: ½ mm. of copper and 1 mm. of aluminum, 35 cm. focal skin distance, high tension disc transformer and Coolidge tube, that a potential less than 140,000 volts (sphere-gap) is not effective in the average depth distances we are required to radiate. A 23 per cent, 10 cm., water-depth dose is not possible with less potential. Therefore, the time factor with the use of 125,000 volts would be so markedly increased that it would be impractical for routine work and perhaps, in the very difficult hair-line cases, actually be contraindicated. At the same time increasing the cross-firing areas to more than four large squares would be found to be impossible. A discussion of the many physical phases as compared with the practical problems of this question of voltage, filtration and focal distance is unlimited. Our experience has led us to believe that the promiscuous changing of these factors is extremely dangerous. The research work of Professor Shearer and Professor Duane have shown beyond a question of doubt that increasing the filtration beyond 0.5 mm. of copper is ineffectual unless we likewise increase the voltage output of our means of transforming electrical energy. A filtration of 3 mm. of aluminum transmits 13 per cent of the wave length; 6 mm. 2 1/3 per cent and 10 mm. approximately less than one-half as much as 6 millimeters of aluminum. It would seem logical, therefore, that unless we make use of at least a potential of 140,000 volts employing the standard factor technic previously described, we are simply fooling ourselves and not obtaining the dosage we may believe we are getting. This is likewise applicable to increasing either the focal distance beyond 35 and 50 cm. or the filtration to 1 mm. of copper, without a marked compensatory increase in our voltage output beyond 140,000 volts.

We have made every effort to keep our voltage readings above 140,000 volts sphere-gap measurements, and in many instances this has been extremely difficult and expensive. With such a high potential, many new electrical phenomena present themselves. These difficulties were further increased when we occasionally increased our voltage to 152,000 volts in selected cases, using the new large three-foot Coolidge tube. We are hoping, however, to continue the use of these higher voltages, if the transformer holds out, making no other changes in our routine factor technic.

The skin reactions following intensive radiation certainly recover more rapidly when filtered through 0.5 mm. copper and aluminum than they formerly did with a 6 mm. of aluminum and a shorter focal distance. The reaction of the patient is more severe with the higher filtration, and in our routine work we find that the skin changes become less and less a danger signal as to just when the total dosage has exceeded the safety limit. We attempted to administer the full dose in one sitting after we began making use of the copper filtration and the increased focal distance, and although the skin reaction was extremely light and practically absent in a few of the cases, the patients did all but succumb to the radiation. Marked constitutional reactions occurred both within 24 hours as well as ten to twelve days following such treatments. We then returned to a division of the intensive radiations; the amount of raying depending both upon the location of the pathology and the reaction of the patient.

In gastric malignancy, for example, we have found it essential to divide the doses even to a greater extent, thus avoiding severe reactions perhaps partly due to the close proximity of the liver and spleen in the path of the radiations. We frequently administer as low as 75 milliampere minutes in a given day, perhaps raying the patient both in the morning and evening, until a total dosage through three ports of entry has been completed. The total dose is too severe to be administered through a single area at one seance in gastric malignancies. Whenever possible we attempt to complete the raying within a period of ten days to two weeks in the average case, and with the previously described factors, using 140,000 volts. Such doses range from 300 to 700 milliampere minutes. The latter intensive radiation, however, will produce severe local skin reactions, and is only applicable in large inoperable breast tumors.

There are many other problems in deep therapy which I should like to review in order to have these points emphasized or criticised in the general discussion; however, the time allowed will not permit me to do so. The question of preparing the patient before and after the intensive radiation will undoubtedly be one of our most difficult problems with the increased higher voltages. Whenever it is possible we are now adopting a routine of having the patient carefully prepared, two days previous to the treatment, by diet, thorough elimination, and alkalinization. We are satisfied that the present more intensive method of x-ray radiations have produced more favorable immediate clinical results than the less intensive methods previously employed. We have, therefore, selected a series of case reports which include the most unfavorable type of malignant tumor pathology, namely, gastric and bladder malignancies, rather than the more favorable breast and lower pelvic conditions, in order to further emphasize the advantages of both copper filtration, increased focal distance, and higher voltages.

CASE REPORTS

Case No. 20,482.—Feb. 10, 1921. Patient, Mr. F. Age 60.

Diagnosis.—Carcinoma of the stomach confirmed by operation and microscopic section. Tumor was palpable and rapidly growing in size. The patient was gradually losing ground, becoming very weak. Loss of weight, appetite, severe dull aching gastric pains were the progressive symptoms. The residue in the stomach at the end of six hours was approximately one-half. X-ray treatments were administered within ten days following the exploratory operative procedure.

Technic.—Through each abdominal port of entry 520 milliampere minutes were administered to the tumor. Three ports of entry were employed: one anterior and two obliquely posterior. Total radiation administered was 1560 milliampere minutes. A definite constitutional reaction followed the first 75 milliampere minutes. This amount of radiation was administered daily, and later increased to 150 and 300 milliampere minutes. On two occasions it was found desirable to allow a rest period of five days, both on account of the patient's severe reaction and the unfavorable blood picture.

Nine months later (November 10, 1921) the patient returned for a physical examination and clinically was found to be in the best of health. During this period he regained his lost weight, which he has maintained up to the present time. The gastric pains and discomforts had practically disappeared; however, his return was partly stimulated by another type of sticking pain in the upper left quadrant. Fluoroscopically this appeared to be due to slight pleural adhesions. The tumor mass remained palpable and could be more sharply outlined. The size of this mass apparently remained constant, following the primary slight reductions.

Comment (analysis of the therapy administered).—Is further treatment indicated at this time? We decided that in view of the progressive improvements noted during the past nine months, further treatment was not indicated. Previous to the administration of radiations, the patient was losing ground rapidly, but the extreme pain and gastric disturbances have disappeared. At present the only symptom present is apparently due to pleural adhesions.

Case No. 20,493.—Feb. 12, 1921. Patient, Mrs. S., age 29.

A young patient, Mrs. S., age 29, complained of an unusual type of gastric pain. Radiological examination by Drs. Soper and Mills showed evidence of a large tumor mass, the size of a small flat orange, within the stomach. Dr. Bartlett operated, confirmed the tumor mass and found a tumor involving the walls of the stomach simulating a sarcoma. Sections of the mass would have been of clinical value. However, Dr. Bartlett was absolutely certain of the diagnosis. For a period of three months a total of 2170 milliampere minutes were administered along the standard technic previously described. During the early treatments the reactions were extremely severe, and it was found necessary to reduce the daily therapy to 75 milliampere minutes at each sitting (15 minutes' treatment with 5 milliampere tube current).

On October 21, 1921 (eight months following the first administration of x-ray), Drs. Soper and Mills wrote that the patient's condition was normal. Although the palpable mass had not

entirely disappeared, her physical condition and symptoms were again normal.

Comment (analysis of the therapy administered).—The patient's health was both physically and clinically improved. The extreme reactions to the treatment could not have been modified to any greater extent. The tumor mass had partly disappeared, and certainly the original tumor pathology was of an extremely rapid growing type in a young woman. In view of the results thus far obtained (eight months) we have no further suggestions to offer as to changes in our radiation dose. The roentgen sickness following occasional radiations, however, was very pronounced and critical at times, and the patient was unable to return for daily treatments. Rest periods of five days each improved her mental and physical resistance to the treatment.

Case No. 20,757.—March 23, 1921. Patient, Mr. R., age 68. Somewhat emaciated. Complains of severe gastric distress and pain. Palpable mass size of an orange visible over stomach region. Drs. Mills and Soper report radiological findings simulating carcinoma involving the pylorus and duodenum. Operation by Dr. H. Mudd confirmed findings macroscopically and microscopically. Apparent metastasis to liver in view of the presence of a small nodule on the surface of the liver structure. Moderately rapid loss of weight. Thirty-hour stomach residue. Wassermann was negative. X-ray treatments administered totaled 870 milliampere minutes over a period of weeks. Similar treatment was given posteriorly.

Technic.—Thirty-five centimeter distance, 0.5 copper and 3 mm. aluminum, Coolidge tube, disc transformer (sphere-gap) capacity 140,000 volts. Administered 5 milliamperes through the tube at one time, varying the daily exposure between 75 and 150 milliampere minutes. When the reaction was too great the above dose was administered every other day. Patient has continued to improve steadily since May, 1921 (two months) following the first x-ray exposures.

On September 16, 1921, Drs. Soper and Mills report the following: "We saw Mr. R. six months after the first treatment and find that he has made a remarkable improvement. There is no palpable mass present. Formerly we could palpate and visualize a tumor mass in the abdomen the size of an orange. He has maintained his weight, eating well, and feeling much stronger." It was thought advisable to give Mr. R. another series of treatments, making use of the very largest three-foot Coolidge tube, and increasing the transformer potential to 152,000 volts sphere-gap measurements, and reducing the time factor, all other factors remaining constant. This series was not completed. The reaction was unusually weakening. We question the advisability of continuing further treatment at present. On November 10, 1921, eight months following the early treatments, we receive a further report from Drs. Soper and Mills:

"Referring again to Mr. R., I may say that we saw him yesterday. His weight was 177½ pounds. His appetite has been good and he has been going to his business. Upon palpation we can find no evidence of the palpable mass that was previously present. His hemoglobin is quite low and his red blood cells reduced to 2,420,000, 36 per cent. I am going to try to obtain his consent to have a transfusion done. His anemia appears to be secondary and not primary in character."

Comment (analysis of the therapy administered).—We have here a patient suffering from gastric carcinoma with a residue of 30 hours, considerable gastric discomfort and pain, who lost steadily in weight previous to operation, and then within a few months again steadily improves. Negative Wassermann. An abdominal mass was palpable the size of an orange. This mass and the gastric discomforts have entirely disappeared. During the past seven months, shortly after the early improvements were first noticed, his weight remained stationary, and even though the summer was extremely warm, he continued to attend to his business. The very recent drop in red cells and hemoglobin is significant. Would it have been better not to continue the treatments, since the patient was enjoying moderate good health, and the tumor pathology and symptoms had disappeared? A somewhat similar reaction followed each treatment, but less extensive, and we hope that with further rest and medical treatment his blood picture will return to normal. Nevertheless, the improved clinical course of the condition following radiation therapeusis for a period of eight months has been an interesting study and certainly more than worth while.

Case No. 10,309.—Case report of Drs. Buford and Kramolowsky:

"About two years ago, while in New York, Mr. S. had trouble in voiding urine. He consulted Dr. H. McKay, who decided he had a stricture, whereupon he dilated him with sounds, and then decided that the patient had cystitis.

"Mr. S. consulted Dr. Robertson, was fulgerated twice and irrigated. Later he was treated by Dr. Marchildon and later by Dr. Lewis, who took sections, and Dr. Ralph Thompson pronounced it a tumor. He was taken to St. John's Hospital and $6000 worth of radium was used on him in seven hours. Following this he was given x-ray therapy by Dr. M. P. Titterington. At the next treatment radium could not be introduced, but later he was given another radium treatment. After the fifth radium treatment there was a great reaction. He then went to Dr. E. C. Ernst for therapy. He now urinates every fifteen minutes and voids blood part of the time. He has lost a few pounds in weight, probably five or six, and has some constipation for the past month or six weeks and a little indigestion at times. This prior to May 25, 1920.

At this time we cystoscoped him and found a necrotic tumor of the trigon and vesical neck. Radium needles were suggested to be used through the perineum. On June 10, at the Jewish Hospital, we used 100 milligrams of radium for twenty-three and one-fourth hours by means of eight perineal needles. He reacted very strongly to this and following it was given mild injections of mercurochrome at the office. The patient gradually became worse until it was necessary to administer morphin in the form of rectal suppositories. Mr. S. became more and more discouraged with this form of treatment

and on November 16, 1920, he ceased treatment with us and consulted a so-called 'Christian Scientist.' While being treated by this 'Scientist' morphin was, of course, withdrawn until finally the pain became so severe that he was forced to return to us. He was given one or two mild injections and a fistula resulted between the bladder and rectum. Patient continued with his x-ray treatment under Dr. Ernst in December, 1920, and following this experienced great relief and was quite comfortable. The amount of opiates used was reduced immediately and he was soon able to do without them entirely. He has gradually picked up in weight, his appetite improved and his bladder capacity increased. At present only a few drops of urine are secreted per rectum daily. A little pain is experienced in voiding; also the frequency of urination is very much decreased. He has just commenced another series of x-ray treatments with Dr. Ernst."

Comment (analysis of the therapeutic procedures).—Here we have a patient suffering from bladder malignancy for a period of over two and a half years. Clinical sequence is as follows:

(a) Suspicious stricture was dilated.

(b) Treated for cystitis.

(c) Later was fulgerated on two occasions.

(d) Later sections were taken of the area involved which were pronounced microscopically malignant.

The second phase of treatment: 50 mg. of radium were applied for seven hours directly to the tumor.

(a) X-ray treatments were administered.

(b) Further radium treatments were given, but the patient continued to grow weaker, urinating every fifteen minutes, also voiding blood, severe constipating attacks apparently due to local obstruction in the rectum.

(c) Further x-ray treatments did not improve his condition. All of the above procedures were adopted prior to June 10, 1920 (eighteen months ago).

Further cystoscopic examination revealed a large necrotic tumor of the trigon and vesical neck.

(a) Radium needles (100 milligrams) were inserted on June 10, 1920 (eighteen months ago), for 23¼ hours by means of eight perineal needles.

(c) The patient became extremely emaciated, practically bedridden, alternated between large amounts of morphin and "Christian Science" for relief of pain. Hard substances such as small pieces of corn, etc., would pass through the urethra. Weight on November 16, 1920, five months following the last radium treatment, was 90 pounds.

The third phase began in December of 1920:

(a) X-ray treatments were again administered merely to attempt a partial relief of the pain which was present.

(b) Instead of continuing with the old technic, we had a heart-to-heart talk with the patient, advised him that we were desirous of giving him the advantage of a more radical method of treatment, which at the same time might produce a marked erythema on the skin, or perhaps do additional damage to the deeper structures. Consequently this was our first case treated along the lines of the following technic:

"Filtration 0.5 mm. Cu., 3 mm. of Al, Voltage Sp. Gp. 140,000 Dsc. rectification 35 cm. distance through three portals of entry, each receiving over a period of two months 700 mm. minutes, or a total of 2100 mm. during this time. The patient's reaction was marked, and frequently two and three days elapsed between treatments. Three hundred milliampere minutes were first administered, one area at a time, and occasionally only a half an hour (5 ma. through tube) was possible. This treatment was repeated in three weeks, so that finally a total of 700 ma. minutes were administered through each area in two months."

Of course we were working in the dark at that time as to the conservative skin dose. The patient obtained almost immediate relief of pain, although the reactions were terrific. The opiates were discontinued, the patient gradually picked up in weight from 90 pounds to his present weight two days ago (November 11, 1921) of 140 pounds, and his bladder capacity has increased so that only a few drops of urine are passed through the rectum daily. A little pain is experienced in voiding, but the frequency is very much decreased, and cystoscopic examination revealed practical closure of the large recto-vesical fistula and a reduction of the bladder tumor pathology. Of course at the present time our technic would differ somewhat with reference to the method of application in this case, although the physical factors are practically similar to those we have employed since that time. Our only problem is, shall he receive further treatments, and should a higher voltage than 140,000 volts be employed, or should the patient be left alone? We decided to continue the treatment since the recto-vaginal fistula is not completely closed, and the tumor pathology in the bladder is still present.

SUMMARY

Is the present more intensive x-ray therapy, which employs higher voltages, heavier filtration, greater focal skin distances, greater radiating fields, definitely productive of better results in deep-seated tumor malignancies?

In answering this question we conclude from the standpoint of the iontometer physical measurements of these rays, the biological changes which have been shown experimentally, the immediate practical clinical results, that by comparison they have more effectively influenced malignant tumor pathology than any other less intensive radiations we employed in the past.

With reference to the practical status of the present more intensive x-ray therapy I certainly hope that the one thought paramount to all others has been sufficiently emphasized in this contribution,

that we, as radiotherapeutists, in this present new era of radiation therapy have many more added responsibilities than it has been our privilege to shoulder in the past for the amelioration and eradication of deep-seated malignant pathology, and must realize more than ever that our future efficient results will depend largely upon the added precision and judgment with which we select the effective electrical instruments and developed physical methods. We must employ these agents with the same skill and in the same manner as the surgeon uses the knife, nevertheless conscientiously considering both the patient and the local lesion, and constructively employing these destructive instruments in combination with other methods when necessary, but with the full co-operation of our fellow physicists, biologists and internists.

Humboldt Building.

DISCUSSION

Papers of Drs. Groover, Millwee and Ernst.

Dr. W. S. Lawrence, Memphis, Tenn.—In general, I am with the gentlemen of the affirmative in all of this: the increased dosage, increased distance, increased filtration, but I am not personally convinced as to the efficacy or rather the necessity of a maximum increase in voltage. At the time the continental workers were using this increased voltage those of us in this country who were not following that were increasing other factors. I find we can get results without necessarily running wild on this dangerous voltage. The advantages from increased voltage can be summed up in a word: increased penetration. The disadvantages are many and have to be taken into very serious account. First, there is the increased danger to the patient, to the operator, and even to those occupying the same building; second, the increased cost of insurance; third, the upkeep. The cost of upkeep is so enormous that we have to increase our fees. The insurance, not only the accident insurance and liability insurance that we carry, but also the fire insurance, will be increased. The fire insurance people will have something to say about insuring a building where one of these super-voltage machines is installed.

This whole question of running after high voltage comes from trying to approach a ray produced in the x-ray tube as penetrating as the gamma rays of radium. Physicists tell us that the gamma rays of radium are thirty times as penetrating as the rays we get from 100,000 volts. To get that we would have to use, not a twenty-inch, but a sixteen-foot spark gap. After we have obtained such a ray as that I believe it can be proved that we have something we do not want. The rays that we are using, I believe, are more penetrating than most of us are inclined to think. They are certainly sufficiently penetrating even from a five-inch gap to penetrate 8 or 10 mm. of aluminum and the hip of a full-sized patient and produce sufficient ionization effect on an x-ray plate to reproduce that hip.

I have one or two plates to show made not with a ten-inch gap, not with a five-inch, but made through 10 mm. of aluminum, a spark gap of 2½ inches and 20 ma. in the tube, the time three times the normal time without filtration. You can calculate that exactly by knowing that 1 mm. of aluminum cuts off 10 per cent of the ionization effect of the rays, the second 10 per cent of what was left, and so on. So that with 10 there is 33 per cent of the original ionization effect left in the ray. Here is a plate made through 12 mm. of aluminum, 3¾-inch spark gap, 30 ma. in the tube and three times the normal time of exposure. This one of the knee was made with higher voltage, 10 mm. of aluminum, 80 kilovolts, 5 ma., 18-inch skin distance and three times the normal exposure. Professor Loeb, of the University of Chicago, has demonstrated that all therapeutic effects are brought about by a chemical effect in the tissues, and that this is in direct proportion to the amount of ionization produced in that tissue by the ray penetrating the tissue. It is well known that lower voltages produce more ionization than higher voltages. The ray that produces the greatest amount of ionization is the ultraviolet. Next to that is the alpha ray from radium. The alpha rays from radium produce about thirty times as much ionization per cubic centimeter of tissue penetrated as do the beta rays. The beta rays produce thirty times as much as the gamma rays.

The problem of deep therapy is this: to produce the maximum amount of ionization at a given depth below the surface. In determining the quality of the ray which will accomplish this end it is to be remembered that gain in penetration means loss in ionization, and gain in ionization means loss in penetration. We are to determine the happy mean which lies somewhere between maximum ionization and maximum penetration. In other words, we are to select a ray which, while possessed of high ionizing qualities, has at the same time sufficient penetration to deliver this ionizing influence to a given depth below the surface of the skin. Whether this ray is produced by a voltage nearer 100,000 or nearer 200,000 is yet to be determined.

It is not unlikely that the ionization chamber will determine this question before the next meeting of this Society.

Dr. J. P. Keith, Louisville, Ky.—There are a few points in Dr. Groover's paper that have been brought out in our own experience, for I believe he made the statement that we are all looking for these things, not that we would change our idea of thinking in malignancy or that we would become surgeons instead of radiotherapeutists. As we all know, most of these are inoperable cases. Recently a surgeon brought us two cases and said, "You do anything you want and I will do anything you want me to." They were sloughing cases of cancer of the breast with large glands in the axilla. After thorough radiation the surgeon was asked to re-

move the sloughing tissue and they were treated again. They are over a year old now without any return of the disease and are in good shape. I think we are all watching to see how the question of high penetration will work out.

Dr. Groover (closing).—Dr. Millwee made one very important statement in regard to his technic which I wish to make in regard to mine. I do not recommend the technic that I use as the best. Nobody knows just now what is the best. We are all feeling our way. I believe, however, that we are traveling in the right direction. It will be a matter of years before we are able to talk about a standard technic. In general our observations coincide with respect to the therapeutic results of the newer method. We are doing things that we were not doing before, and in the course of time we shall be able to make a material impression on the mortality of malignant disease.

Dr. Millwee (closing).—I do not believe it has been made clear by the speakers that the copper filter has a distinct advantage over the aluminum filter when we wish to give large doses of x-ray in the deep tissue. I have checked these measurements very carefully, using an ionization apparatus for measuring the ray, and I find that if we use the ordinary 10-inch spark gap and ½ mm. copper filter with a 20-inch skin target distance it is possible to deliver to the tissues four inches below the skin surface, about 28 per cent of the amount of the ray reaching the skin. By the same technic if we use the equivalent in aluminum we get only about 25 per cent four inches below the skin surface. From the discussion here today it would seem that the great question which is before us regarding deep roentgen therapy is "Do we wish massive doses? Do we wish large doses below the skin surface?" If we do, we must use higher voltage and heavy copper filters, and the greater the skin target distance the better.

We can secure a much more satisfactory dose in the deep tissues of the patient by the employment of 250,000 volts than with only 140,000 volts, and do it with much less danger of a serious skin reaction, and with less toxemia, because in using higher voltage our ray will be more evenly distributed throughout the tissues, and such a large skin surface will not receive such intense radiation as is necessary with the low voltage.

The dangers which Dr. Lawrence speaks of are not great to my mind, and if we use the precaution of proper installation as I have shown you, which completely protects the operator and the patient from the danger of electric shock or stray rays, there is not so much danger as in using a 10-inch spark gap as it is generally used today.

Dr. Ernst (closing).—We are not obtaining the desired but necessary radiations in the deeper structures, the actual lethal cancer cell dose, which many of us think we are getting. The physical measurements which we made with the ionization chamber methods of measurement apparently indicate that we are on the danger line of under-raying our lesions in the deeper structures, especially if our dosage factors have not been carefully re-checked and standardized. First of all, our technics must be standardized, and perhaps our electrical equipments simplified and similarly standardized, and not until that time arrives, as Dr. Millwee has shown, will it be possible for all of us to treat malignant pathology with similar methods and more or less equal results.

The "proof of the pudding is in the eating." Applying this axiom to our own observations and those of Drs. Millwee and Groover with special reference to the more favorable results following more intensive radiations, unquestionably during the past five or six months our immediate results have never been equalled by the less penetrating radiations we employed in the past previous to December, 1920. The previous technic employed was as follows: 140,000 volts (equivalent 9½-inch spark gap); 6 millimeters of aluminum as filter; 8-inch focal skin distance; cross-firing through every conceivable small field of entry until a skin erythema developed. Several of the cases did not react favorably to the above method of treatment, especially the bladder case mentioned, but they apparently did respond to the more penetrating type of radiations by means of the increased focal skin distance by substituting ½ millimeter of copper for 6 millimeters of aluminum. The patient had two types of x-ray treatments and previous to this time (approximately six months) radium application. She improved following intensive radiations and has continued to improve. The hopeless and inoperable breast malignancies never did respond so rapidly and effectively to other types of radiations. In the future, more favorable results are directly dependent upon a further increase in the penetrating power or shorter wave lengths employed in our radiation therapy.

For the present we must constantly keep in mind the necessity of repeatedly checking our physical dose factors. The voltage should be carefully measured at intervals and above everything else kept constant. We must not jump from one method of treatment to another without carefully considering the advantages of the newer methods.

At all times both the patient and the disease must be considered. The individual characteristics of the patient, the malignancy, the resistance and blood changes must be carefully studied.

Anyone who has tried both methods will very early realize that we are on the right track. There is a distinct advantage in increasing the focal distance, the quality and quantity of filtering material, and employing uniform and higher voltages through the Coolidge tube. Radiations should be employed which reach the pathological lesion under consideration and not rays which are largely absorbed by the superimposed normal tissue structures and the skin.

LAMBLIA INTESTINALIS WITH REPORT OF CASES*

By J. E. Knighton, M.D.,
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The literature on this subject by American authors, in which cases of lamblia infestation have been reported in the United States, has been exceedingly meager until within the past year or two. Since biliary drainage by means of the duodenal tube has come into more common and frequent use, with proper examinations of specimens secured in this way, numerous cases are being brought to light which previously, no doubt, would have passed through the hands of the physician unobserved.

During the present year three cases have come under my observation, each of which was discovered through routine examination of specimens secured by duodeno-biliary drainage. A brief report of these cases follows:

The first case, Mrs. J. B. W., came under my observation in September, 1919. She was a white woman, age 40, occupation housewife, a native of Louisiana and had never traveled or visited in the tropics. She had borne four children, the youngest of which was not alive but had been born fourteen years previously. No miscarriages. Menses irregular, the flow being excessive at times. In January previous to this consultation she had an operation for the removal of a polypoid tumor from the uterus, and nine years previously had an abdominal operation for removal of one ovary. At the age of fourteen years she was troubled with diarrhea, which persisted throughout the summer. No other illness except the usual diseases of childhood. Present complaint, which consisted of attacks of pain in upper abdomen and gaseous distension, had been present at intervals for the past four months. There had been no nausea nor vomiting and no jaundice. Appetite good. Bowels normal. No loss of weight.

Physical examination showed that the nutrition was good, the mouth healthy except that the patient had had considerable dental work done, consisting of permanent bridges and crowns. Heart and lungs normal. No enlargement of liver or spleen, but definite soreness to pressure was made out over the right hypochondriac region. X-ray examination of the gall-bladder region showed an outline of the gall-bladder. No shadows were seen indicating stones. Urine was normal.

Red cell count, 4,840,000; white cell count, 7,500. Differential count: polymorphonuclears, 66 per cent; small mononuclears, 25 per cent; large mononuclears, 6 per cent; and eosinophiles, 2 per cent. No malarial parasites were found.

Analysis of the stomach contents, withdrawn one hour after the Ewald breakfast, gave free HCl 42.5; total acidity, 60. The fasting stomach contained free HCl.

A diagnosis of chronic cholecystitis was made and the patient was given advice relative to diet and treatment along the usual lines. She then returned to her home in a neighboring town and I heard nothing more from her until January of the present year (1921), at which time she returned with very much the same complaint as that stated in 1919.

In addition to the usual routine examinations, the duodenal tube was employed for securing specimens of bile for examination. This was found to be literally swarming with Lamblia intestinalis. The bile was of a very dark color and contained, in addition to the above-named organisms, much mucus, many pus cells and a variety of unidentified bacteria. There were also crystals of bile salts present. The flagellates were exceedingly active and fulfilled perfectly the descriptions given in the literature. To quote Dr. Lyons,

"The doctor who has not seen a specimen of this organism in the active state has missed a very delightful microscopic experience."

The duodeno-biliary drainages were continued at intervals of two days with the result that after the second drainage none of the organisms could be found in the duodenal contents, which were secured before introducing the magnesium sulphate solution. And only a few were found in the "B" bile after centrifuging. After the third treatment no more of the organisms were found either in the active state or in the encysted form even after thorough centrifugalization.

After two or three subsequent drainages with negative searches for lamblia, the patient was permitted to return to her home. She was relieved of the former symptoms and felt well. She returned in two weeks, at which time the bile was almost normal in color and other characteristics, and was negative for lamblia after careful search. I was encouraged to hope that a permanent cure had been effected, but suggested to her physician that he continue the biliary drainages once a week for a while. This was done and the patient continued to feel well until September, when she returned for an examination after a recurrence of her symptoms. At this time the lamblia were found fairly numerous in the centrifuged bile from the gall-bladder. None was found in the drainage from duodenum before introducing magnesium sulphate solution.

On November 7, she returned after having been without a drainage for two weeks. The bile was again very dark in color and showed the other usual characteristics of stagnant bile. The lamblia were present in large numbers and were very active in the duodenal drainage before magnesium sulphate was introduced and also in the gall-bladder bile.

*Read before the Southern Gastro-Enterological Association, meeting conjointly with the Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

The two succeeding cases were men, ages 30 and 46, respectively, and neither had ever traveled or visited in the tropics. I shall not report in detail the histories of these cases, but each gave the usual history of chronic cholecystitis. One had had his gall-bladder drained surgically, but suffered the same symptoms within a few months after operation. No stones were found at operation. Upon the return of his trouble, transduodenal drainage was instituted and examination of the fresh specimen revealed lamblia, quite numerous and very active.

The third and only other case that I have seen had been given duodeno-biliary drainages quite a number of times before these organisms were discovered. Finally, a specimen was examined promptly after withdrawal and lamblia were found.

I have observed that these parasites do not remain active very long in the specimen secured after introducing the magnesium sulphate, which probably is not a very favorable medium for their existence. For this reason it is necessary to examine the specimen while it is fresh and still warm. If it is centrifuged the organisms are much more readily found. The two patients mentioned are free from symptoms at present, but I do not expect them to secure permanent relief since meeting with disappointment in my first case, and in view of the fact that others have met with the same disappointment.

I believe that the intestinal tract may be rid of these parasites by introducing magnesium sulphate solution in fairly large quantities into the duodenum, but of course the solution does not come in contact with those that are adhering to the walls of the gall-bladder and are not expelled. The remaining parasites multiply rapidly and soon reinfect the duodenum. I have reached this conclusion since on numerous occasions I have been unable to find the parasites in the centrifuged duodenal contents of patients who had recently had several treatments. However, after failing to find them in this way before introducing magnesium sulphate solution, I have on numerous occasions found them in the bile from the gall-bladder. If there were any doubt as to Lamblia intestinalis invading the bile passages, this should settle the question.

Regarding treatment of this condition with arsphenamin, I have had no personal experience with it. I have suggested this treatment to these patients who are still under observation, but for some reason they have made excuses to have it deferred from time to time. I hope to be able to give it a trial in the near future.

CONCLUSIONS

(1) Lamblia intestinalis invades the bile ducts and gall-bladder. This has been observed by Smithies in cases of gall-bladder disease that were treated surgically.

(2) Lamblia may be capable of producing cholecystitis or may have been only a complicating factor in the cases reported.

(3) Lamblia infection is not necessarily associated with diarrhea. Only one of the three cases mentioned had at any time been troubled with a persistent diarrhea and this was many years before the onset of the present trouble.

(4) Transduodenal lavage or duodeno-biliary drainage gives only temporary relief.

Discussion follows paper of Dr. Simon, page 462.

FURTHER OBSERVATIONS OF LAMBLIA INTESTINALIS INFESTATION AND ITS TREATMENT*

By Sidney K. Simon, M.D.,
Associate Professor of Medicine, Tulane University,
New Orleans, La.

In a recent communication presented to the American Medical Association, last June, I recorded in detail two cases of Lamblia intestinalis infestation, and called attention to an apparent increase manifested by this type of protozoal infection in the South within recent years. Since that time, eight additional cases have come under my observation. My main purpose on this occasion, besides the recording of the many-sided clinical aspects presented by these cases, is to direct attention again to the importance of recognizing the infection and to the need

*Read before the Southern Gastro-Interological Association, meeting conjointly with the Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

of determining the role it might play in the causation of some of the doubtful cases of intestinal disturbances peculiar to our section. The following represents a brief summary of the clinical details of the eight cases in whom Lamblia intestinalis were found in the course of routine examinations of the stools:

Case 1.—Mrs. W. L. S., white, female, age 38, came under observation June 22, 1921, presenting the following history. She had suffered digestive disturbances for the past four to five weeks, her symptoms consisting in the main of a burning sensation in the epigastrium with sour eructations, appearing irregularly after eating, and relieved by alkalis. During the past week she had noted a heavy, full sensation in the epigastrium immediately after the ingestion of food. Her bowels had been obstinately constipated for several weeks, though short spells of diarrhea were present at periods of one to three days on an average of once or twice a month. During these attacks the loose movements would occur mostly during the morning hours and were accompanied by intestinal cramps. The number of movements never exceeded 6 within 24 hours. The stools were of watery character without blood, and tenesmus was entirely absent.

The patient was of a highly neurotic temperament and was subject to frequent attacks of headaches. She was a native of Michigan, but had resided in New Orleans for the past nine years, and had never been in the tropics. On physical examination she appeared undernourished, with slight pallor. The lungs were negative, as likewise the heart. Stiller type abdomen with marked gastroptosis and palpable right and left kidneys. Abdomen over-distended with gas. The test breakfast showed rapid gastric motility with approximately normal acidity. Blood, hemoglobin, 85 per cent; polymorphonuclears, 76 per cent; lymphocytes, large 1 per cent, small 20 per cent; eosinophile, 2 per cent; basophil, 2 per cent. The urine was negative with the exception of an excessive amount of indican. The feces were well formed and upon microscopic examination large numbers of Lamblia intestinalis cysts were repeatedly found.

Drainage of the gall-bladder by the Meltzer-Lyon method revealed increased bacterial content, cholesterin crystals, but no vegetative Lamblia were found. Besides dietetic and other measures, this patient was subsequently given intravenous injections of arsphenamin. Examination of the stools following this procedure failed to adduce further evidence of the encysted forms. The digestive disturbances have likewise improved markedly since this treatment was instituted.

Case 2.—Jean A., white, female, age 5, a native and resident of Texas, was referred to me in August, 1921, with the following symptoms: since December, 1920, the patient had had a persistent diarrhea, the number of stools ranging from 5 to 9 daily. The movements were of watery consistency and contained large amounts of mucus. The condition had been diagnosed as entamebic dysentery and had been treated with ipecac and emetin without relief of the diarrhea. A dull, sore, aching sensation was constantly present in the lower abdomen in connection with an increase of abdominal gas. The loss in weight approximated five pounds. No noteworthy physical abnormalities were detected. The examination of stools showed a great increase in the mucus content with large numbers of Lamblia intestinalis cysts. Most careful search of the watery stools failed to reveal, however, the presence of the vegetative forms. On proctoscopic examination no ulcerations were found in the lower bowel. In view of the fact that objection was raised to the employment of arsphenamin intravenously the drug was introduced directly into the duodenum through the duodenal tube, in doses of two decigrams. This procedure was followed for three successive treatments with an intervening period of one week between each treatment. The patient suffered no untoward effects from this procedure. Following the first injection, no cysts were found in the stools, and subsequently repeated examinations have failed to reveal their presence. Clinically, a prompt subsidence of the diarrhea and abdominal distention has been recorded and in a recent communication the mother has informed me that the patient has improved markedly in every respect.

Case 3.—J. L. S., white, male, age 10, a native and resident of Mississippi. This patient had had the usual childhood diseases and in addition had suffered with so called "weak stomach" since infancy. Five months before coming under my observation the mother had discovered round worms in the stools, for which successful treatment had been instituted. He had always been of a highly nervous temperament and the night rest was frequently disturbed with nightmares. The bowels were open regularly each day and no history of diarrhea could be obtained. The diet had not been restricted in any way. Physically, the patient was of normal height and build. Heart and lungs were found negative. A general adenopathy was present, affecting particularly the glands of the neck. Tonsils and adenoids were reported normal by a competent specialist, who advised against their removal. The abdomen was flaccid and without sensitive areas. Liver, slightly enlarged and palpable. Wassermann reaction, negative. Blood: hemoglobin, 80 per cent; polymorphonuclears, 60 per cent; lymphocytes, 40 per cent. Urine examination negative with the exception of an excessive amount of indican. The feces were well formed. In the routine examination of the hardened fecal mass, Lamblia intestinalis cysts were found. No treatment was attempted for the infection in this case. The cysts have persisted in the stools constantly since the first observation.

Case 4.—Mrs. J. P. L., white, female, age 45, gave the following interesting history: she had complained of digestive disturbances for the past twenty years, which consisted for the most part of spells of intense nausea appearing immediately after eating. Pain of a throbbing character was present in the right hypochondrium, more or less constantly, and was made worse by eating. The diet had been restricted to soft foods for a number of months prior to her coming under observation.

Nine years previously the abdomen had been opened and a diseased gall-bladder found. Because of conditions present at that time the gall-bladder was not removed, but instead surgical drainage was instituted covering a period of several weeks. Marked improvement followed this procedure for an interval of two years. Following this, the pain in the right hypochondrium returned and was again accompanied by considerable nausea. The bowels had always remained persistently constipated. No loss in weight had been recorded.

I saw the patient for the first time in May, 1921, and found her to be a well-nourished individual with normal heart and lungs. Abdomen slightly distended with gas. The liver was found to be enlarged, measuring five and one-half inches in the mammary line. Considerable pain was elicited on deep pressure over the gall-bladder. The case was referred to me by Dr. C. A. Allen for trial of non-surgical drainage of the gall-bladder. Upon making routine examination of the biliary contents obtained through the duodenal tube large numbers of vegetative lamblia were found in conjunction with a great increase in pus cells and bacteria. Ten biliary taps were made upon the patient covering a period of approximately two weeks and in each instance the lamblia organisms were found to be present in the biliary drains. The encysted forms, however, were constantly absent from the stools. Arsphenamin injections intravenously were given five days apart for three injections. At the conclusion of this treatment repeated biliary taps failed to reveal any further evidence of the highly motile vegetative lamblia. However, the abdominal pain and nausea persisted, despite this treatment, and finally recommendation was made for surgical intervention.

On September 10, the gall-bladder was removed by Dr. Allen and was found to be of the strawberry variety. Scrapings from the mucosa, taken directly at the operating table, did not reveal any evidence of the lamblia organisms. The patient made an uneventful surgical recovery and has experienced no further clinical symptoms.

Case 5.—M. O., white, age 8, female, a native and resident of New Orleans, had measles and whooping-cough in early childhood. Since the age of 2, the patient had been subject to attacks of diarrhea, appearing at irregular intervals. The ingestion of large quantities of cereal foods had been found particularly to induce diarrheal attacks. During these attacks five or six evacuations would occur daily, usually watery in character, but unaccompanied by blood. No cramp pains were complained of and the movements were noted mostly during the afternoon hours. This patient was well nourished and of good color. Examination of heart and lungs proved negative. Abdomen relaxed and slightly overdistended with gas. Tonsils and adenoids normal. Test breakfast, normal motility with hyperacidity. (HCl, 46; t.a.: 78). Blood: hemoglobin, 85 per cent; polymorphonuclears, 46 per cent; small lymphocytes, 44 per cent; eosinophil, 6 per cent; basophil, 1 per cent. The stools were soft and pultaceous and on microscopic examination were found to contain large numbers of the encysted forms of Giardia intestinalis and Tetramitus Mesnili. Drainage of duodenal contents proved negative for the vegetative organisms. The diarrhea in this case was treated on dietary grounds, and before an attempt could be made to institute special treatment for the protozoal bowel infections the patient deserted.

Case 6.—J. W. C., white, male, age 24, a native and resident of Louisiana, sugar chemist by occupation. Consulted me first in July, 1921, complaining of a pain of dull character in the upper abdomen, independent of eating. The patient had found that purgatives tended to relieve this pain. The abdomen was considerably distended with gas, which the patient found great difficulty in expelling. During the past year there had been diarrhea spells, during which time the abdominal pain increased in severity. The bowels remained costive in the intervals between the attacks of diarrhea. There had been no loss in weight.

The beginning of the disturbance dated from an attack of influenza which had occurred during his period of military service in France, in 1918. Because of the persistent abdominal pain the appendix had been removed in 1919. No improvement followed this operation.

Physically the patient was of normal build and weight. Thoracic organs were normal. Abdomen slightly distended with gas. No sensitive areas were present. The test breakfast showed slight delay in gastric motility with approximately normal acidity. Urine and blood negative. Feces examination revealed the presence of Lamblia intestinalis cysts. Upon note of this finding, an immediate attempt was made to remove the infection with arsphenamin. Three injections in all were given, and at the end of this period the cysts were found to have disappeared from the stools.

Case 7.—Mrs. G. B. L., white, female, age 31, wife of an army officer, resident of New Orleans past six years. This patient had typhoid fever in 1908 and her health had not been below normal since that time. In 1918 a laparotomy was performed, the appendix and right ovary having been removed. Three years previous to that time tonsillectomy had been done, following an acute attack of tonsillitis and rheumatic fever. Varied digestive symptoms first made their appearance in September, 1920. She complained principally of an increase in abdominal gas accompanied by an aching pain in the right hypochondrium. This pain was especially marked during the early morning hours and particularly so after a bowel evacuation. The feces were, however, of normal consistency. Physical examination made by me August, 1921, revealed nothing noteworthy. The liver was found slightly enlarged, measuring five inches in mammary line, and some pain was elicited upon deep pressure over the gall-bladder. The gastric analysis showed complete achylia with delayed motility. A moderate degree of secondary anemia was present. The differential white count revealed: polymorphonuclears, 64 per cent; lymphocytes, 35 per cent; eosinophil, 1 per cent. In the routine examination of the stools, Lamblia intestinalis cysts were found. Likewise, in biliary taps carried out according to the Meltzer-Lyon method, the vegetative forms were demon-

strated in prodigious number. Two injections of arsphenamin were administered with an interval of seven days. The effect on the organisms was most marked in this case. Subsequent examinations of the duodenal and biliary secretions and of the stools failed to show any further evidence of the infection. The clinical features improved under this regimen also, the subsequent observations having indicated that the patient is suffering with a chronic gall tract disease.

Case 8.—L. G., white, male, age 48 years, merchant by occupation, a native of Italy, but a resident of New Orleans for the past twenty years. This patient had been ill off and on for three years. His complaints pointed distinctly to some gastric disturbances, and in fact on four occasions he had suffered massive hemorrhage from the upper intestinal tract, accompanied by prostration and other evidences of severe gastro-intestinal bleeding. As a result, all the clinical evidence pointed to the presence of a duodenal ulcer in this case. The gastric acidity was high and the motility somewhat increased. The bowel movements were regular each day and of normal consistency. The finding of lamblia cysts in the stools was of purely accidental origin during the routine course of examination. No special treatment was attempted in view of the urgent need of attention for the peptic ulcer.

SUMMARY

The clinical features of the cases, as will be observed, presents a markedly diversified picture. In some quarters an attempt has been made to set up a definite symptomatology resulting from a parasitization of the intestinal tract with Giardia intestinalis. In this connection it must not be overlooked, however, that as is the case with other protozoal infections of the bowel, clinical manifestations may be absent even in the face of prolonged infection. In five of the cases recorded above, it may be noted that no history of diarrhea could be elicited. In the other three cases the diarrheal outbursts appeared irregularly, alternating with periods of constipation. The character of the evacuations varied likewise, but in most instances were of a watery or mushy consistency.

Blood, apparently, does not form a characteristic feature of giardia stools, a point which might prove of clinical value in the differentiation from the diarrhea of entamebic origin. In each case an increased amount of abdominal gas was present and was productive of cramp-like pains, appearing usually before defecation. Loss in weight was noted in three of the eight cases, but in no instance was it marked. Most authorities comment upon the frequency of giardia infection in children. It will be noted that three of my cases were below the age of ten years. A review of the blood findings shows an absence of distinctive features. In Case 3, a 6 per cent eosinophilia was recorded, but this was caused by a coincident infection with Trichuris trichuria. Case 2 proved of particular interest in that an inflammatory condition of the gall-bladder was plainly manifested. The discovery of the vegetative giardia in large numbers in the drainings from the gall tract through the duodenal tube brought forth the conjecture as to whether the organisms themselves might not have proved the exciting cause of the gall tract infection. It is at least conceivable that the highly motile trophozoites of this species may carry bacterial organisms in their trail in their passage from the upper intestinal tract into the gall tracts. Although the giardia were, apparently, eliminated by treatment in this case, surgical intervention ultimately became necessary to relieve the patient's abdominal distress.

DIAGNOSIS

In analyzing the clinical features of the cases exhibited above, it is evident that no one symptom or even group of symptoms are to be relied upon in diagnosing Giardia intestinalis infection. The sole guide must rest, finally, either upon the discovery of the distinctive organisms in the stools or in the aspirated secretions from the upper intestinal tract. The organisms, for the most part, inhabit the duodenum and jejunum and under certain pathological conditions may find their way into the gall passages and gall-bladder. The encysted forms, on the other hand, are found equally distributed throughout the entire intestinal tract and appear in the formed and unformed evacuations, where they are subject to detection by microscopic examination. They show up as a rule in showers, but periods of weeks may elapse during which, despite careful examination, no encysted forms may be found. In all cases of indefinite diarrhea, especially where increased abdominal gas forms a prominent

feature, suspicion at least should rest upon the presence of a giardia infection, and recent experience has taught me that careful search should be made in the stool for the presence of these organisms.

TREATMENT

The eradication of giardia infection, once it has become firmly entrenched in the intestinal tract, has proved, in the past, a signally unsuccessful undertaking. All kinds of so-called intestinal disinfections have been employed without effect upon the organisms. Both ipecac and emetin are devoid of influence over this type of intestinal protozoa. In the two cases reported by me last spring transduodenal lavage, with Jutte solution, was given a thorough tryout. In one case the cysts promptly disappeared from the stools, but control has been lacking in determining the permanence of this effect. In the other case the results proved disappointing.

Yakimoff, in 1917, was the first to suggest the use of arsphenamin in the treatment of giardia infection. He employed this drug experimentally in mice, using 1 c. c. for twenty grams body weight. Two years later, Carr and Chandler made use of this preparation for the first time in the human individual for the purpose of eradicating Giardia intestinalis infection. Their results proved so promising that I have myself made free use of the drug in six of the cases reported above. In one case, that of the five-year-old girl, the drug was introduced directly into the intestinal tract through the duodenal tube, while in the other cases the intravenous route was selected. In each instance we found a prompt disappearance of the cysts from the stools and so far as I have been able to ascertain subsequently, no further trace of the infection has been made out.

It is, of course, entirely too premature to speak of final results in these cases, but the results at least hold out promise for success, unattained, as yet, by other therapeutic agents.

DISCUSSION

Papers of Drs. Knighton and Simon.

Dr. J. L. Jelks, Memphis, Tenn.—If you study and watch your cases you will find more of this type of gastro-intestinal infection. Whenever you find the "showers" the Doctor spoke of you will find the symptom complex.

The duodenal tube has been a wonderful means of study of gastro-intestinal infections and the treatment of this condition. I dare say the time will come when the doctor who treats typhoid fever or infection of any part of the small intestine without the duodenal tube will be derelict. He will be censured if he has his patient where it could be used and if he is capable of using it. Why have not some of you internists tried this treatment in typhoid fever? Any flagellate infection of the small intestine calls for duodenal lavage, and magnesium sulphate will not do it.

You noticed the symptomatology these gentlemen gave you. However, they have not given you all the symptoms we have found. They did not tell you whether they had tender cervical nerves or not, but they had. It was admitted that they had indicanuria. They had toxic symptoms and trophic lesions of the skin. Sodium chlorid and sulphate solutions, which I have described in my chapter on dysentery, are an efficient means of treating this infection. I wish to offer another solution that I believe will be valuable, a 1/25,000 to 1/10,000 solution of gentian violet, by transduodenal lavage. After considerable transduodenal lavage, a liter of sodium sulphate and chlorid solution or gentian violet solution is useful. After you have used magnesium sulphate, fill that patient full of bismuth subnitrate, one to two teaspoonfuls three times a day.

I see why arsenical preparations have been good in some cases. I believed they were good formerly, but did not know why. But why not put arsenic in the duodenum and kill these organisms? If you try the gentian violet test (Jelks and Abner) you will find that every one will show a 2-4 plus gentian violet reaction within forty-eight hours if you have not killed the infecting organisms first.

I hope you will investigate your cases more closely to see if you do not find you have combined degeneration of the cord or what you term "pellagra" in some of them, or if "pellagra" has not or does not develop in some of them.

Dr. A. L. Levin, New Orleans, La.—I saw six cases of lamblia at the Beauregard Base Hospital in 1918. The diagnosis was verified in the laboratory. We tried various remedies, but could not control it. On looking over the literature I found that Deglos in May, 1920, wrote an excellent article describing his experience in army camps for two years. He was assigned to study this subject and had a series of twelve cases of lamblia. His opinion was that lamblia is more often found in combination with other intestinal parasites. He states that it may be found alone, but as a rule it is with other parasites. He classified his cases in two groups: the sub-acute and the chronic. In the sub-acute form he described the ballooning of the abdomen as Dr. Simon mentioned, but says this is not found in the chronic type. In the chronic he also mentioned

that the patients always had three or four stools a day and in those he usually found cysts. His experience with various drugs, including arsphenamin, was not satisfactory. He gave these drugs in capsules and intravenously, but without success. He claims that his best results were obtained by the administration of capsules of turpentine, alternating with salicylate of bismuth, from 4 to 8 grams daily.

Dr. Charles G. Lucas, Louisville, Ky.—I have had only two cases of lamblia. One of these has not gotten well, and the other was relieved only by removal of the gall-bladder. In many duodenal drainages I have never found Lamblia intestinalis. I was glad to hear Dr. Simon report on this last case. I failed to get results. In these two cases, I tried everything except the intravenous injection of arsphenamin. In one case I gave large doses of bismuth, without result.

The use of the duodenal tube brings out some points I never thought of before. In the treatment of typhoid fever it should be used with great benefit to settle the question of carriers.

Dr. John A. Witherspoon, Nashville, Tenn.—For a number of years I have been studying intestinal parasites, and have had some experience with the treatment described by Dr. Simon. In some cases the disappearance is remarkable. The first time I ever used it was about two years ago, upon an old lady. She was not affected at all by the treatment. She continued to have a large number of intestinal parasites.

The next occasion in which I used it they disappeared almost instantly, and so far as I know the patient is still without parasites. I examined him some eight months later and they were still absent.

I should like to call attention to the use of the duodenal tube in typhoid fever suggested by the previous speaker. We have been speaking of parasitic infections of the bowel, but typhoid fever is not a parasitic infection of the bowel. It is a constitutional infection. As long as the Bacillus typhosus remains in the bowel it does no harm. When it gets up into the lymphatic structures and into the circulation, then we have typhoid fever. I cannot see how we can treat an infection like typhoid fever by using the duodenal tube. I do not believe the treatment of typhoid fever by the so-called intestinal parasite remedies ever did any good. We are dealing with an infection that is constitutional, which runs its course, and no local treatment of the bowel will ever affect it. Of course many bacteria may be disturbing the patient, but it is not the typhoid bacteria.

I am very glad to hear the reference to turpentine in treatment. I have used turpentine for the last six months. Large doses of bismuth sometimes combined with sulphur give good results. After you have given sufficient quantities of bismuth, which is insoluble, and get the germs more or less mixed up with it, then wash them out and you have really done more to get rid of the flagellates than anything else I have ever known except the use of arsphenamin. I think it has done good. All these arsenical preparations give good results in all intestinal parasites of the flagellate type.

Dr. Jelks.—I wish to ask Dr. Witherspoon one question. As we know, a 1-10,000 solution of gentian violet will inhibit if it does not destroy all the infection there. We know that it would inhibit the growth of the Bacillus typhosus as well as relieve the engorged and gas-filled intestine and destroy the bacteria that create all this intestinal trouble. That being, as he will admit, a large factor in the development of typhoid, I should like to ask if such treatment would not be indicated if he knew it would do that? I know personally that it will.

Dr. Witherspoon.—If the Doctor is correct, it will do all he said, which I doubt. The next thing is this: the formation in the bowel of typhoid tympany is usually owing to bad dietetic regimen, improper diet. It does not seem sensible to give a diet to produce a thing and then try to relieve the symptom you have produced. If the patient were dieted properly, I do not believe he would have much tympany.

Dr. Bryce W. Fontaine, Memphis, Tenn.—In making routine laboratory examination of stools, it has been my experience that all parasitic infections are rare in our locality. Furthermore, it has been my observation that most of the cases of uncontrolled diarrhea have been due to achylia gastrica and not to parasitic infections.

Dr. Daniel N. Silverman, New Orleans, La.—With a very recent experience of two cases in which lamblia were found in the duodenal contents, I want to say a few words relative to the pathogenicity of these protozoa. While it is quite true that the latter are demonstrable in the contents after the introduction of magnesium sulphate through the duodenal tube, we cannot say that the giardia are inhabiting and causing the existing biliary infection. In one case there was a flare-up of symptoms during a third pregnancy which was terminated by an incomplete abortion. Although the patient was curetted, her symptoms persisted. Bile drainage by means of the Meltzer-Lyon method certainly showed a pathological bile in addition to great numbers of vegetative lamblia.

Our second case was very instructive because of the opportunity afforded by the examination of the gall-bladder bile at operation. We found the same character bile as was recovered by the duodenal route, but while the latter contained myriads of giardia, neither did the gall-bladder mucosa nor its contents reveal any of the parasites or their cysts.

Incidentally, it may be said that the enzymatic activity of the duodenal contents was suppressed in each of these two cases which we have attributed to the reflex action of diseased gall-bladders.

Dr. John M. Bell, St. Joseph, Mo.—In northern Missouri we do not see many of these cases, but frequently when we do, we find a recurrence.

I should like to ask Dr. Simon whether he has reached a point in the observation in these cases, as in typhoid fever, where he finds that some people may be regarded as carriers, and is it

essential in the treatment in these cases that the intestinal parasites be completely eradicated? Is it possible completely to rid the intestinal tract when once infected?

Dr. Levin.—It has always been a question in my mind why we invariably find these flagellate organisms in the intestinal tract where we have an alkaline medium. Seldom, if ever, do we find them in the stomach. Evidently they cannot survive an acid medium. Some say there is acid formation in the intestine when lamblia develops, but the acid is of a different character from that which we find in the stomach. I should like to ask Dr. Simon if, by the aid of the duodenal tube, it would be a feasible plan to destroy or dislodge them if we use a solution similar to the gastric content: whether or not hydrochloric acid of the same strength as we find in the stomach, adding perhaps pepsin to make the intestinal tract acid instead of alkaline, would make the field unfavorable to them so they would be dislodged?

Dr. Elliott C. Prentiss, El Paso, Tex.—We see many cases of Lamblia intestinalis. The flagellates were noted in about 11 per cent of all stools I have examined. I was particularly interested in getting arsphenamin in solution into the duodenum.

I have had very little difficulty in doing away with the acute symptoms and diminishing the diarrhea; but it has been extremely difficult to rid the patient of the last parasite. In the past I have attributed my failure to cure them to the fact that there was a secondary bacterial infection complicating the inflammatory condition caused by the parasites. This was clearly evident in some of the cases. Consequently I used bacterial vaccines in the chronic cases and have found improvement to a certain extent. The fact that the parasites are present in the gall-bladder explains why we have not been able to rid patients of them.

I am a little skeptical as to results with the gentian violet solution, but I shall try it. I have tried turpentine very carefully, but have never had good results from it. It is extremely irritating and produces a severe watery diarrhea, so I have stopped it. I have given bismuth in large doses to stop the diarrhea and severe symptoms. That will relieve, but it will not kill the last parasite. I have used sulphur in many cases and they have improved a little under this treatment, but without any permanent result. I have given all of these a thorough trial, separately and in combination.

As to magnesium sulphate, is its insertion into the duodenum considered a specific against this parasite, or does it wash them out from the intestinal canal? I have given it into the duodenum by the tube and have also given it into the stomach, but have never been able completely to rid the patient of the parasites. I believe from the discussion today that the reason I have not been able to do so is that the nidus is in the gall-bladder and bile tract. From now on I shall treat them with that in mind. Also I am going to use arsphenamin through the duodenal tube.

Dr. Knighton (closing).—I have observed that these organisms retain their activity only a short time when in the presence of magnesium sulphate solution. Therefore, the specimen must be examined while fresh and still in order to get the best results. The organisms may be overlooked in a cold specimen, whereas a specimen from the same patient that is examined immediately after being withdrawn may show them very active and numerous.

The cases that I have seen have been in rather robust patients, such as are so frequently seen in cases of cholecystitis.

As to whether Lamblia intestinalis is responsible for cholecystitis in these cases remains a question. It may be only a complicating factor.

Dr. Simon (closing).—There are a number of misconceptions that the discussion has brought out in regard to flagellate infections. Nobody, I think, today believes that the presence of a few flagellates in the intestinal tract represents a definitely pathological condition. Wengon some years ago stated that he considered the intestinal tract harbored a normal intestinal fauna as well as a normal intestinal flora. The flagellates only become definitely pathologic, I believe, when they multiply rapidly and accumulate in prodigious numbers in the intestinal tract. Lamblia intestinalis has two discs by which it attaches itself intimately to the intestinal epithelium, and it is for that reason that it is most difficult to eradicate.

The treatment of lamblia infection by means of so-called intestinal disinfectants is doomed to failure. The organism must be reached through the blood stream. My purpose in introducing arsphenamin through the duodenal tube was not to reach the organism directly within the lumen of the intestinal tract, but indirectly through the blood stream. Some of the patients on whom I tried this treatment refused to take the drug intravenously, and I therefore had to adopt the other method.

Dr. Fontaine made the statement that he does not find this infection in Memphis. I have heard it said before that such and such a protozoan does not exist in this or that locality. If they are properly searched for, they will be found to exist in practically every locality, particularly in the South. Some years ago Sistrunk found sixty cases of primary intestinal protozoal infection in Minnesota.

The thing I have always tried to lay stress upon is that we must not let the diagnosis depend solely upon finding the vegetative organisms in the stool. The most important work probably is in discovering the encysted forms in the hard, dry, constipated stool.

The carrier question is an interesting one, and has already been partly answered. I should consider finding the cysts in the stool in showers or in large numbers as definitely pathological, and I believe that the cyst bearer should be treated in the same manner as the case showing active infection, even though no clinical symptoms may be present at the time.

Regarding the suggested use of alkalies, it should always be remembered that this is not a surface infection of the bowel and also that it

would be quite dangerous to acidify the intestinal tract to any degree. You must get the arsphenamin into the blood stream in order to kill the organisms effectively.

Dr. Jelks' idea of the use of gentian violet is not new. Much was written some years ago on that subject. Two years ago I tried the drug, using it in one-grain pills, but it had absolutely no effect on any of the flagellate infections. I have discarded it.

The employment of bismuth subnitrate is really begging the question. You merely convert a diarrheal condition into one of constipation. Naturally you do not find the motile flagellates in a dry stool and the drug is given credit for a cure. Careful search of the stools, however, will almost invariably bring forth the encysted forms.

MICROCOCCUS LANCEOLATUS MENINGITIS WITH AUTOPSY REPORT*

By Oliver W. Hill, M.D.,
Knoxville, Tenn.

This case was seen through courtesy of Dr. Herbert Bolin, Mascot, Tenn. The only interesting feature is the peculiar train of symptoms presented, coupled with post-mortem findings. Reported below by Dr. Bolin.

CASE REPORT

Wm. Curtis Ellis, age 5 years, was first seen on March 5 about 6:30 p. m. He was apparently in a state of profound shock or collapse.

His parents stated that William and the rest of the children were out in a nearby field playing. There was an abandoned house near. William was playing as usual until about 4 p. m., when one of the children came home and said that William had fallen asleep and could not be aroused. None of the children could account for his sleeping. They did not know whether he had fallen off the porch or not; neither could they tell how long he had lain there. The child's mother said he had been about as usual for the last several days. Said the child had never been ill. She had lost one child the year before with tuberculosis of the bowel.

Examination.—Temperature by rectum was normal. Pupils, both dilated, and did not respond to light. Pulse was full and regular. Few moist rales over both lungs. Abdomen slightly distended; very foul breath; no bleeding from the eyes, ears or nose; throat clear. Washed stomach; results good; contents showed undigested tomatoes, potatoes, etc. Patient could swallow. Gave 4 grs. calomel and soda, followed by castor oil. Enema showed good results.

TREATMENT AND COURSE

March 6, 10 a. m.—Patient still in unconscious state; pulse, 90; temperature, 99°; respirations, 24. Mother reported that the patient had good results from the purge. Stools very foul. Tongue still heavily coated and breath very bad. Repeated calomel and followed it with Epsom salt.

March 6, 3 p. m.—No change.

March 7, 10 a. m.—I saw the patient with Dr. Bolin. Temperature, 101°; pulse, 120, and slightly irregular; respirations, 26; Kernig negative; Babinski reflex negative; knee jerk, diminished; pupils normal, and responded to light. The child was conscious and called for water. Stools frequent, foul odor, greenish in color and very thin. Spinal puncture: fluid clear; very little pressure; cell count 16; showed nothing abnormal; urinalysis negative.

March 7, 4 p. m.—Temperature, 102°; pulse, 128; respirations, 26; no other change.

March 8, 10 a. m.—Temperature, 103°; pulse, 140; respirations, 30; patient very nervous; slight twitching of muscles on right side. Ice cap applied to head. Tepid soda baths ordered.

March 8, 5 p. m.—Practically no change.

March 9, 10 a. m.—Temperature, 104°; pulse, 140; respirations, 30; convulsions; paralysis of the entire right side; patient cannot swallow. Bromid administered per rectum. Ice caps, baths and enemas continued. Other treatment given when possible.

March 9, 4 p. m.—Temperature, pulse and respirations, the same. Convulsions not so frequent. Otherwise no change.

March 10, 10 a. m.—Temperature, 101°; pulse, 140; respirations, 30. No other changes.

March 10, 5 p. m.—Temperature, pulse and respirations, the same. No other changes.

March 11, 10 a. m.—Temperature, 100°; pulse, 100; respirations, 24. Convulsions much lighter and farther apart. Paralysis still persistent. Patient can swallow better. Pulse not quite so thready. Treatment continued.

March 12, 9 a. m.—Patient is growing weaker. Convulsions are much more frequent. Pulse is thready and irregular.

10 a. m.—Patient died at 4 p. m. Autopsy.

AUTOPSY FINDINGS

Age, 5 years; sex, male; color, white.

Cause of Death.—Micrococcus lanceolatus meningitis.

External Appearance.—Well developed and fairly well nourished. Post mortem lividity posteriorly. No deformities and no eruptions or other peculiarities.

Head.—Scalp, normal. Skull, normal. Dura mater, thickened, firmly adherent to skull and strips off with difficulty. Color, dark. Sinuses distended with blood. Pia mater, thickened and vascular. Sero-sanguinous exudate covering both hemispheres.

Brain.—Consistence of substances lessened to moderate degree. Color, dark. Ventricles show no excess of fluid. On section, the cortex shows a pink color.

Thorax.—No examination.

Abdomen.—Examined.

Kidneys.—Examined.

Cultures from sero-sanguinous material obtained from surface of brain show micrococcus lanceolatus in pure culture.

Sections.—Show inflammatory exudate and thickening of the meninges.

*Read in the Section on Pediatrics, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

TROPICAL DISEASES AND PUBLIC HEALTH

FIELD WORK ON TUBERCULOSIS*

By Henry Boswell, M.D.,
Director, Bureau of Tuberculosis, Mississippi State Board of Health, and Superintendent, State Tuberculosis Sanatorium,
Sanatorium, Miss.

By field work is meant the various forms of educational work done for the prevention of this disease which, to be successful in the shortest possible time, must be divided into: (1) sanatorium; and (2) extension or field education. This short paper will have to do only with the latter.

It is quite generally conceded that it is within the realms of possibility to control tuberculosis completely in any given community; that it is not possible to do so by any quarantine or segregation scheme, and it is quite likely that no such scheme will ever be possible. If this be true, then the control is quite obviously dependent upon education alone.

As in all other educational work, it must of necessity be a local issue, directed through local agencies, either governmental or volunteer, which must be supported by the local communities. These agencies of course can be assisted by outside or state agencies quite successfully if proper credit is given, and the work done through local agencies of whatever character present and organized.

In this work particularly we are confronted with the problem of untrained workers, that is, untrained in the epidemiologic features and the peculiar characteristics of the disease. It is the writer's belief that all local health officers should receive special training in at least the epidemiology of tuberculosis, not with the idea of his becoming a specialist, but that he may deal intelligently with a disease quite different in its control to other diseases commonly met with.

It is very commonly stated that if other diseases are controlled in a given area tuberculosis will disappear. This is true only in that by the control of certain diseases the incidence will decrease for at least a time and only to a certain point. But a better knowledge of the disease would temper such statements in that it can be controlled only to a certain point in this way, and that as the disease decreases the population becomes relatively more susceptible to it, as a result of lessening the immunity of the unexposed population.

By proper training the health officer would be in a position to combat the ever-present fumigating characteristics of the average population; also the carrier problem which is perhaps our greatest. The carrier problem is not that of the active case, but the inactive open case performing his usual routine of life.

Granting that one has the trained workers, then the campaign in a given community may be carried on as follows:

(1) As a general campaign.
(2) Special education, and
(3) Case epidemiology.

As a general campaign is meant the campaign directed against all disease and defects found in a given community which will undoubtedly lessen the incidence of tuberculosis.

By special education is meant sensible scientifically proven facts given to the general public by lectures, special school work, demonstration by cases, placards, stereopticons and motion pictures. To the average population the latter holds the greatest possibilities, but unfortunately no films have yet been gotten up for other than above the average citizenship.

The special school work may and should consist of teaching certain well-established facts, and of encouraging support of nutrition clinics and the supervision of the malnutrition cases which in the writer's work have shown from 22 to 58 per cent tuberculous infection.

The literature should be simple and readable, placing pamphlets of more de-

*Read in Section on Public Health, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

tailed information in the homes where actual contacts are known.

The writer would not discourage in any community the possibility of a reasonable so-called phthisiphobia, as the average citizen will cooperate in any movement to control a disease only in proportion to his fear of it.

By case epidemiology is meant the bedside teaching of the care of the case, the protection of others who might come into the house and the teaching of known contacts, methods of right living which will lessen the danger of a break down. It is undoubtedly true that all living in a house with a case have already become infected long before the case is diagnosed.

In conclusion, no program for the control of this disease is complete unless bovine tuberculosis is controlled in the same communities. This can be easily handled in cooperation with the Federal Bureau of Animal Husbandry.

It will never be complete without adequate control of the indigent incurable. This can be accomplished only by the agencies in power building a home for indigent incurables, and suitable laws being passed for the proper commitment of such cases. The home for incurables should be a natural result of a successful educational campaign.

ORGANIZATION

State Department of Health
Director
Bureau of Tuberculosis
Sanatorium Extension Dept.
Director
Local Health Department
Health Officer
Volunteer Agencies Population

DISCUSSION

Dr. James A. Hayne, Columbia, S. C.—Dr. Boswell's paper illustrates the necessity of a well-rounded public health education for the man who is to undertake the control of any special disease. This Dr. Boswell had. He is not an enthusiastic specialist on any one single disease, but views that disease as a part of the whole thing which goes to affect public health.

The control of tuberculosis has fallen somehow or other into the hands of a group of laymen who are struggling faithfully to control the disease without seemingly having given much study to its epidemiology and to methods of control.

That the sanatorium should be a school for instructing people to go out as missionaries into the community and teach the people the prevention of tuberculosis is the idea which we have tried to impress upon our legislatures every time we have gone before them to ask for funds for our tuberculosis sanatorium. There has been a desire in our state to put the tuberculosis hospital under the Board of Public Welfare, which takes care of hospitals, penitentiaries and other institutions, instead of under the board of health. The only argument I could use against taking it away from the State Board of Health was that we were using it as an educational institution to teach the people methods of controlling tuberculosis, and as the State Board of Health under the law was the sole adviser of the people of the state in matters pertaining to health, no other board could take the hospital away from us and use it in the proper way.

Dr. D. J. Williams, Gulfport, Miss.—I have recently made a tuberculous survey in our county. When I attempted to prepare a survey sheet on which to record such information as I wanted to tabulate I was very much surprised at the inability of the various organizations throughout the country to furnish me with assistance in getting up a suitable survey sheet. I wrote to the heads of a number of health departments, and got absolutely no information that was worth anything. So I attempted in my own way to make out a record sheet that would suit our conditions.

We have been tabulating and indexing our tuberculous cases for more than four years. I was under the impression before I began this recent work that we had between a hundred and thirty and a hundred and fifty of these cases throughout the county. When we finished we had a complete record of only thirty-two or thirty-three cases. I found that many of our tuberculous patients had died, many more had moved out of the county, and a number could not be accounted for. These, of course, were largely among the negroes.

I made a complete record of the patients, their home conditions, their social surroundings, financial conditions, etc., and have also made records of the contacts. On Dr. Boswell's return home he will find a copy of these awaiting him.

I believe this is the one way by which we are going to handle tuberculosis successfully in our county work. We will have a number of infections, the nature of which will be known later. By making these surveys and getting our immediate contacts under observation, we can check the spread of the disease.

In our work we have examined the contacts who have remained in the home, but a number of these have gone from the home, and we have no record of them. We are attempting to perfect our records.

While we make these surveys I do my utmost to get these people into the hands of their regular physician. Sometimes I have been embarrassed because I did not consider the regular family physician able to handle the case and wanted to get

this particular patient into more competent hands. This must sometimes be done.

Dr. Boswell (closing).—I do not believe that any sanatorium supported by Government funds is worth one single nickle to the people, as a general thing, outside of the control of the health agencies. It is fundamentally a part of the health work. Any sanatorium for the care of tuberculosis alone will save a few lives, but the expense is so great on the rest of the people that the saving of the individual life in the governmentally owned institution is rather an expensive thing. Where it is controlled by the municipal or state health department it can be turned into a school. Then every patient brought in and sent back is a real worker, a better worker than many of the paid workers we can get. He has the influence, the confidence of his people when he goes back among them. I seriously doubt that any sanatorium for a population of less than 250,000 people in the South is a success. I see so many little county institutions, that become not places of treatment or education, but rather paupers' homes, where the indigent people are often neglected.

If we are going to cure tuberculosis we must turn the sanatorium into a school and do it properly and send out those people wherever we will. In other words, the Government is investing money in individual citizenship and the dividends are the return of the citizens.

Tuberculosis can never be wiped out except by a well-organized local health department.

THE POSSIBILITIES OF COOPERATION OF RAILROAD OFFICIALS WITH LOCAL, STATE AND FEDERAL BOARDS OF HEALTH IN THE PREVENTION OF DISEASE*

By Joe P. Bowdoin, M.D.,
Adairsville, Ga.

The conservation of man power and the increase of its efficiency appeals to all employers of labor, and the sympathetic cooperation of our vast railroad systems with local, state and Federal boards of health should meet with the hearty and cordial support and approval of the employes. With this triumvirate to labor for the betterment of surroundings of the employe and the comfort and safety of the traveling public there should be a marked improvement in the final results. Labor will be more dependable and better able to produce. There will result happiness and contentment in the home of the section men, the agents, the coal handlers, the water station men and in that vast army engaged in the transportation departments.

Thousands upon thousands of dollars are lost to both the men and the companies through malaria, typhoid fever, dysentery, syphilis, gonorrhea and other infectious and contagious diseases.

This waste of time and money could and should be saved to both. The great object to be attained, the prolongation of life, will be ample reward for the labor and expenditure of funds. The co-operation of the railroads in furnishing labor and money is necessary, owing to the very limited appropriations made to the local and state boards of health.

An individual cannot perform a good and satisfactory day's labor who is ill, or who has serious illness in his immediate family. The best results are secured from labor that is physically and mentally well, where the surroundings are good, wholesome and sanitary, where the mind is free from anxiety and worry and where the wages of the workman are not continually drained by heavy bills from sickness and death. When in straitened circumstances from paying this particular kind of bill, the workman becomes dissatisfied, despondent and is more easily influenced to ask for a change in his condition and surroundings, for his hours of work to be shortened and pay increased.

I also wish to call your attention to a broader view, that of the dependency of the railroads' income from freight and passenger revenue upon the health and productiveness of the country through which it operates.

Another statement upon which we can all agree is that a very large per cent of our illness is preventable, varying in estimates from 60 to 90 per cent. In many of the diseases we know the cause and how to prevent them or control their spread.

*Read before the Southern States Association of Railway Surgeons, Auxiliary of the Southern Medical Association, Hot Springs, Ark., Nov. 14-17, 1921.

VENEREAL DISEASES

In regard to the prevalence of contagious and infectious diseases I should like to invite your thought to syphilis and gonorrhea, constituting about 22 per cent of the whole. It is a waste of time for me to call your attention to their seriousness and to the end results that are disastrous to all concerned. They are so common that there is scarcely a family which has not suffered directly or indirectly from them.

MALARIA

Dr. H. R. Carter has made the statement:

"Where malaria seriously prevails it does more injury to the community than any other disease. * * * No such community is or can be prosperous—certainly no white community.'

We of the South have a problem of great magnitude, but from work done it is not without hope. Among the pioneers of railroad cooperation in malaria control we find the work of the St. Louis Southwestern Railway lines prominently at the front. They have recently issued a pamphlet, "Malaria Control: A Demonstration of Its Value to Railroads Based on Experience of the St. Louis Southwestern Railway Lines," which I commend to you as a very valuable study. I quote from the opening:

"The burden placed on railroad management by preventable sickness among employes must be reflected in reduced earnings. It is unquestionably true that no other preventable disease affects railroad operation in the Southern states so adversely as malaria, or chills and fever."

In Georgia the control of this disease has been demonstrated beyond question. The Central of Georgia Railway, under the direction of its Chief Surgeon, Dr. Craig Barrow, has made a most convincing demonstration. Most efficient control work has been done in Mitchell County by the Georgia State Board of Health, in cooperation with the U. S. Public Health Service and the county authorities, which we should be glad to have you investigate. Since my time is limited, I cannot give detailed statements.

I quote a paragraph from a recent letter received from Assistant Surgeon-General Warren answering our question whether the Public Health Service could furnish expert service to railroads:

"In regard to the furnishing of additional sanitary engineers to Southern railroads for the purpose of conducting malaria surveys and other sanitary work, you are advised that work along this line will be conducted by the Service upon proper request insofar as our appropriations will permit."

THE INTESTINAL INFECTIONS

The intestinal infections, typhoid, dysentery, diarrhea, parasites, etc., all of which are widespread and most disastrous, can be controlled by the proper sanitation of the homes of employes and the proper handling of drinking water for coaches, cabooses and stations.

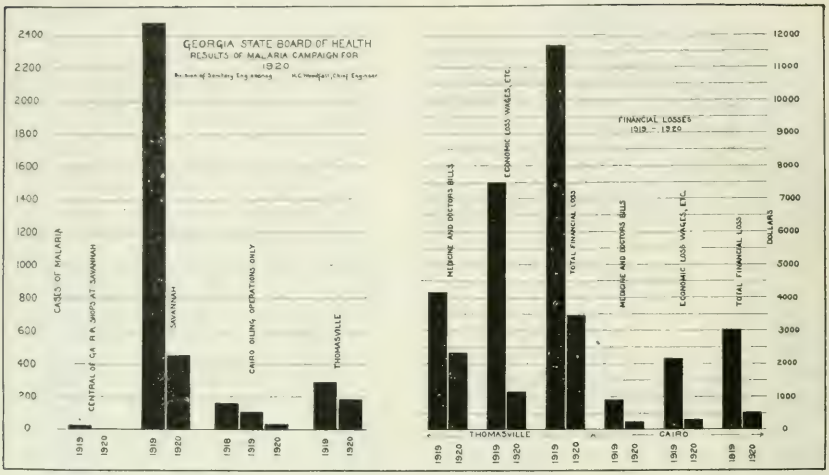
Attention is called to the potential danger of the chronic carrier of disease in the present method of the disposal of human excrement. Traveling from Maine to California and from Washington to the Florida Keys, this is especially liable to infect the maintenance of way gangs who have to handle the ends of the ties with their hands.

QUARANTINE

The enforcement of the quarantine laws and cooperation of both the carrier and the officials can do much to control the spread of disease.

TRANSPORTATION OF DEAD

All must admit that there is danger in the transportation of dead bodies, not only from a standpoint of health, but also from the monetary side, as damage suits are very liable to be brought where they are not safeguarded. The health of the employee and the public are endangered by the careless handling of such shipments. The question that presents itself is, when embalming should be required and under what conditions should such shipments be permitted without embalming. If the transportation be conditioned upon the embalming of the body, then the short distance shipper is put to too great an expense. On the other hand, a short shipment may, on account of unavoidable circumstances, exceed the time limit before it reaches its destination and the body may become a menace to the public health by the pollution of the associated



baggage or express, to say nothing of the risk run by the employe of the transportation company who handles the body. No arbitrary time limit can be placed upon such shipments which will meet the requirements of scientific preventive medicine.

This is especially true in the Southern states, where the temperature varies to a great extent within the twenty-four-hour period. The question has not been settled. It is one that deserves careful consideration.

STEREOPTICON SLIDES

Boards of health should be willing, and I assume that they are, to furnish stereomotograph and stereopticon slides to be run along with "Safety First" views. I believe that our roads could invest money profitably in some automatic device for displaying stereopticon slides in passenger waiting rooms and other public places to carry their silent and constant message of safety first, preventive medicine and other educational matters. The preparation of manuscript for insertion in railroad publications, pay envelopes, placards, etc., could be done to meet particular conditions in limited sections or as the problems might develop. Inserts for pay envelopes and official correspondence might be made very valuable.

The Federal and state boards should furnish experts for making surveys and the giving of advice where it is deemed advantageous or desirable.

The inspection of water supplies for employes, as well as for the general public, could no doubt be arranged for.

The authorities should be in position to furnish lecturers to the roads to address certain groups on health, and especially the menace of venereal diseases, also for the instruction of young men and women on sex hygiene.

Much educational work could be done by board of health officials in talking to groups of shippers of food about proper packing and handling of food and perishable freight, carrying with it the advantage of expert advice, saving the railroads from claims of indemnity and assuring the public a better and sanitary delivery of its eatables. They should furnish men for inspection and to give expert advice on the sanitation of the homes of the section men, make the necessary laboratory examinations as occasion might demand. They should furnish ty-

phoid vaccine and such like products to safeguard the employes and in turn the public who come in contact with them.

With the proper cooperation and coordination the railroads offer to the public health officers a wonderful opportunity to reach a class of citizens who are well paid for their labor and in consequence are able to install in their homes the necessary sanitary devices and take the necessary care of those of their families who may be sick.

Last, but by no means least, is the wonderful opportunity which the health authorities could find in the hundreds of local surgeons throughout the South, situated along the arteries of trade and commerce, with the force of their community's confidence in them as missionaries. These would spread the gospel of sanitation and proper living in the prevention of disease and the lengthening of human life.

DISCUSSION

Dr. E. D. Martin, New Orleans, La.—The railroad surgeon stands out, except in a very few cases, as a necessary evil to the railroad, and is not appreciated. I wish to move that this paper be referred to the Chief Railway Surgeons' Committee, which will meet here some time today and take the matter up to see whether it is possible to get the matter before the proper heads. The only way to succeed is to organize all of the roads. We must make every employee a stockholder in an association which looks after him when he is sick.

The Southern Pacific Railroad has an admirable organization. Every man in it feels he is entitled to advice, treatment and care. You can make it more far-reaching by carrying out the suggestion of the Doctor and giving group lectures at certain times upon these conditions. In Louisiana some years ago Dr. Dowling started just such a thing as this, which had a wonderful influence all over the State. It has been done in other states. Now is the time to take the matter up and if it is possible organize the roads and put ourselves on a proper footing. On some roads the surgeons are not under the head of the chief surgeon, nor has he any say in the matter at all. The medical department is subservient to the legal department.

Dr. E. O. McDermott, Wilmott, Ark.—The railroad companies are ready to cooperate with us in this problem of public hygiene. In the swamps of Louisiana and Arkansas, malaria constitutes about 90 per cent of our troubles. If the subject is properly brought before the railroads their cooperation will be hearty. Inefficiency is a cause of a great deal of expenditure. It makes railroad dividends less. Efficiency of the operatives is the one particular point in which the railroad companies are interested.

Consider what a large organization like the National Cash Register has done for its employes. The railroad companies today, especially the Northern railroads, are pensioning their old employes. The Missouri Pacific system is pensioning them. It has been my experience in railroad companies in thirty years as a surgeon that the companies are only too anxious to do the right thing to upbuild the community, to make life more happy and more useful for the operatives.

In the South most of the section men are negroes. They are illiterate. Their homes are unscreened. The man has a large liver and large spleen. They do not live—they merely exist—and are not capable of putting in eight hours of efficient hard work. They are well paid for it, but the company does not get the amount of labor that it should get for the expenditure of that money because the negro is not able physically to perform the labor for which he is hired. He has no rich good blood where he has malaria infection. There is a great deal being done now by the different states to eradicate malaria. In north Louisiana in the swamps and in southern Arkansas the proposition is too large to interest us now. It is the duty of the railroad company, through the local and dispensing surgeon, to educate the railroad operatives so we may reduce malaria to a minimum.

The immediate attention of the railroad surgeon in this strictly malarial district is to warn the negro section foreman in regard to loss of labor and efficiency as the result of malaria, because 90 per cent of our trouble is of malarial origin. I hope this body will do everything it can to impress on the railroad companies the importance of this move and I believe they will heartily cooperate with us.

Dr. W. F. Smith, Little Rock, Ark.—Ten years ago when I came to Little Rock I found many cases of malaria and typhoid in the hospital wards. I discussed the matter with the General Superintendent of the Southern District. I told him that it was an economic problem and should be dealt with from that standpoint as far as the railroad was concerned. When a patient came to the hospital he could be attended to from the hospital standpoint.

Instructions were issued and vigorously carried out that all drinking water be boiled, all camp and section houses be screened; where the fencing and bridge gangs stopped for more than two days in any one spot, trenches were dug and these trenches sprinkled with lime. The average stay per patient in the hospital that year was 11.1 days. The attendance the next year was reduced 26.4 per cent. It was not all due to the elimination of malaria and typhoid infection, but very materially due to that. Basing the amount paid the employee at $2.00 a day, a saving in labor was made to the railroad estimated at twenty thousand dollars. It is a matter of education. At the close of the meetings that were held by the various trainmasters and superintendents, instructive talks were made along these lines. As I went over the road, wherever I saw a camp or boarding car or section house with a window screen torn, or a screen door hanging on one hinge, I dropped a wire to the General Superintendent and it was immediately corrected, in a way which tended to have it kept in repair thereafter.

The people were taught that typhoid was usually disseminated through drinking water.

The habits of the anopheles mosquito were also discussed. The employes were cautioned about being out where they could be exposed to the bite of the mosquito. We have had very satisfactory results and these orders are still in effect on the Southern District.

Dr. Bowdoin (closing).—Railroad managements cannot be expected to view these questions from our standpoint. The physician sees many angles and problems, but his chief aim and object is to prolong life and prevent disease. Railroads have invested capital that is expected to earn dividends. Therefore all questions of public health must be approached from an economic angle. I do not for a moment want to be understood to say that railroad boards and management are not interested in the men and women who work for them, but they are from Missouri and must be shown. We can show them that health, long life and consequent service can be bought and will pay handsome dividends.

Results can be secured with very little expense. The same results can be obtained in the control of typhoid fever and other infectious and contagious disease.

I should like to see some progressive railroad sanitate all section houses, station agents' houses and stations, making them a model for the entire section of the country—a model for rural sanitation. It would be a wonderful step forward and would be of inestimable good to the section traversed by the road.

SURGERY

RAILWAY, INDUSTRIAL, GYNECOLOGICAL, OBSTETRICAL AND UROLOGICAL

OPERATIVE TREATMENT OF CERTAIN FRACTURES: FEMUR, HUMERUS, FOREARM*

By Edwin W. Ryerson, M.D.,
Chicago, Ill.

The treatment of some of the more common fractures is still too largely a matter of individual preference, dictated on the one hand by text book information and on the other hand by availability or lack of proper materials for the most successful methods of treatment. Practitioners who undertake the care of fractured bones should prepare themselves and their hospitals for such cases, and should understand clearly their own responsibility.

In every community there should be established a place, preferably in a hospital, where splints and splinting material of standard varieties can be procured and applied. The time is rapidly coming when the public will rightfully demand better results in fractures than have been secured in the past. There is no good reason, for instance, why each community should not have a Balkan frame and a few Thomas splints. The frame costs $22.00 and the splints $8.00 or $9.00 a piece. The modern fracture traction tables are much too expensive and can be substituted by a metal pelvic support and a pair of rope and pulley tractors. A can of good dental plaster of Paris and a roll or bolt of starch-sized crinolin are the only other things necessary for the competent care of nearly all of the more common fractures. With these materials, and a man who knows how to use them, the economic efficiency of a given community will be greatly increased.

Consider what a loss in time and money may occur when an adult wage earner fractures the neck of his femur and fails to obtain a bony union. Why does he fail to obtain a bony union? Because no one in the neighborhood knows how to reduce and immobilize his fracture by the Whitman method, or else because the proper materials are not at hand. There is no longer any excuse for putting such patients to bed in a Buck's extension with sandbags and long side splints. You can not get a useful union by that method. The lateral traction, advised by Maxwell and Ruth, has never gained many adherents and requires a long period of recumbency.

Whitman's method is simple and is followed by a high percentage of good results. It can rightfully be called an operative method, because it involves the actual reduction of the fracture, usually under an anesthetic. The technic should be perfectly understood by general practitioners, for they are the men who take care of most of the fractured hips.

The patient is placed upon a pelvic support which has a perineal post. If this is not at hand, a folded sheet may be placed between the legs and tied to the head of the table. The legs are pulled upon by assistants or traction apparatus until they are of equal length, the operator lifting the trochanter upward at the same time. The leg is then rotated slightly inward. These maneuvers approximate the fractured surfaces of the bone. Both legs are then spread widely apart in abduction to the extreme limit possible. This brings the trochanter against the upper rim of the acetabulum and stabilizes the fracture. A long plaster of Paris spica bandage is then applied over sufficient cotton padding, with the leg held in firm abduction. The cast is worn for at least three months and no weight-bearing is allowed for eight or nine months longer. The patient is gotten out of bed as soon as possible and is encouraged to walk about on crutches.

*Read in Section on Orthopedic Surgery, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

This method of treatment is applicable to the great majority of cases of fracture through the neck of the femur (intra-capsular type), no matter how old or how fat the patient may be. The union may not be absolutely accurate from an anatomical viewpoint, but it is almost certain to be excellent from a functional standpoint.

Cases of old ununited fracture of the neck of the femur can not be successfully treated by this method, because the ends of the fragments will have become covered with fibrous tissue which must be removed by operation before bony union can take place. If open operation be decided upon, a bone graft should be made from the tibia and driven up through a hole bored just below the trochanter, extending through the shaft and neck into the head. It is very important to drill this hole at the same angle as the neck, and not at a right angle, since the mechanical effect of the slanting graft is to draw the fragments together by the pull of the muscles, whereas, with a right-angled graft the effect is to push them apart. This operation is by no means easy, and it requires some degree of mechanical ability.

It is not necessary to use special dowel-cutting instruments to round off the edges of the graft, since a square peg will give as good results as a round one. In fat people it is sometimes very difficult to expose the joint and insert the peg, owing to the depth of the incision. The wound should always be drained, because of the impossibility of controlling all of the oozing, and of the danger of infection in a large blood clot. The drains can be removed in a day or two, after oozing has ceased. No one should attempt to peg or nail a fracture of the neck of the femur without exposing the joint, because, first, the fragments usually need to be freshened or to have intervening soft tissue removed; and, second, it is almost impossible to be certain that the peg is properly directed through the neck into the head. It is difficult enough even with a good operative exposure.

In cases where the head and neck have undergone considerable absorption, the head may be removed, the end of the neck rounded off and placed in the acetabulum, and the great trochanter chiseled off and fastened lower down on the outer side of the femur, as has been brilliantly proposed and demonstrated by Whitman.

Fractures of the shaft of the femur, whether simple or compound, are best treated by traction in a Thomas splint with Balkan frame. If, after a reasonable trial of this method, the position of the fragments is not satisfactory, it will probably be justifiable to cut down upon the fracture, since the most frequent cause of misalignment is the interposition of soft parts. Operative intervention is much more often required in transverse fractures than in oblique. A transverse fracture in a child, for example, may fail to be reduced after several attempts under general anesthesia. There should be little hesitation about cutting down upon such a fracture. A short intramedullary peg, autogenous, or preferably of beef bone, will prevent lateral displacement and the Thomas splint with traction can then be applied with every assurance of a good result. It is very easy to have several sizes of beef bone pegs made by filing or turning in a lathe or grinding on an emery wheel. They can be boiled with the instruments and the proper size selected after the bone has been exposed. If longer splints are desired, they can be put in place by the simple technic described by the writer in the *Journal of the American Medical Association* November 1, 1919.

Intramedullary bone splints have been unfavorably criticised by various authors, sometimes on the ground that they interfere with the circulation in the medullary canal, and sometimes on the ground that they do not hold the bones strongly enough. In regard to the circulatory interference, the writer can state positively that he has seen no case of recent fracture in which, after the use of this method, there was the slightest evidence that the plugging of the medullary canal delayed the union of the fracture in any way. The method is not advised in old, ununited fractures, where sclerosing or softening changes have occurred in the bones. In such cases, autogenous inlay grafts, or the step-cutting method would

be indicated, although the writer has one case of fracture of the middle of the humerus in which, after four unsuccessful operations, two of them autogenous inlay grafts, success was finally attained by a very long autogenous intramedullary splint running the entire length of the marrow cavity.

The other criticism of the intramedullary splint, that it is not strong enough, is perfectly true if one expects the splint to do all the work of fixation without any external appliances. This, of course, is absurd, for no one at this time would attempt to treat long bone fractures without some form of external support. Some of our English colleagues, however, do not take this view of the matter. Hey Groves, for example, in his book on "Fractures," published in 1916, says:

"To operate upon a fracture and then depend upon a splint with long immobilization to prevent displacement, is a weak compromise. Whatever method is employed ought to be capable of holding bones firmly without splint or immobilization for an indefinite time."

He therefore uses metal plates with staggered screws or bolts and cotter-pins, or very long steel intramedullary pegs, and dispenses with plaster casts and splints and traction almost entirely. With these ideas the writer is not in accord. It is his opinion that nearly all of those fractures which require operation can be treated as successfully and more safely by the use of absorbable materials. In transverse fractures an intramedullary peg of bone or ivory furnishes a much stronger mechanical support than an inlay graft which is fastened by kangaroo-tendon sutures or by beef bone or ivory screws. A long peg can be used where it is important to guard against lateral angulation, as in fractures of both bones of the forearm. A short peg can be used where it is simply desired to prevent displacement or overriding in cases where traction can be relied upon to prevent angulation, as in fractures of the shaft of the femur and humerus. An intramedullary splint can be applied with much greater ease and with much less exposure of the bone than is required for plating or inlay grafting. The periosteum does not have to be stripped up, and this is of much consequence in certain types of fracture.

It is not to be understood from the above remarks that the writer is advocating the use of the intramedullary peg to the exclusion of other methods. The peg is not suitable in cases where there is comminution or splitting of the bones, nor can it well be used in oblique fractures. It seldom finds a place in fractures of the tibia or fibula. Its chief value is in transverse fractures of the femur, the humerus, and the forearm. It is rarely of value in ununited fractures.

OBLIQUE AND SPIRAL FRACTURES

It should be understood that oblique and spiral fractures very seldom require open operation. Nearly all of them can be successfully treated by traction, either in a splint or in a Balkan frame, or in a combination of the two. It may be necessary to apply the traction directly to the bone, as by the tongs or Steinman nail or bone calipers, but usually the adhesive plaster extension will suffice. Cases which actually need operation can be quickly and accurately fastened by one or two metal bands of the Parham or Collins variety. These bands act on good mechanical principles, and do not interfere with bone formation or bone growth.

FRACTURES OF BOTH BONES OF FOREARM

These fractures are usually transverse, and overriding, and in many cases can not be accurately replaced by manipulation or traction. The normal function of the forearm is of such great importance that open operation is here indicated in a very fair proportion of the cases. As the bones are practically subcutaneous for most of their extent, it is safe and simple to cut down upon them and insert small, short, intramedullary beef-bone pegs. These pegs can be lightly hammered into the distal fragments, and then by angulating the arm at the fracture they can be simultaneously slipped into the proximal fragments which have been drilled out to afford a loose fit. The forearm is then supinated and immobilized by a plaster cast or a splint extending from the axilla to the base of the fingers.

Ununited fractures of the forearm, especially those with loss of portions of the shaft, offer a rather difficult problem. Small inlay grafts almost always fail, as

they become absorbed after an apparently perfect union. Massive grafts, fastened by beef-bone screws, ordinarily succeed when the fragments are not too soft to hold the screws. The most successful and most widely applicable method is the use of large grafts tapered at the ends (the "diamond graft" of Starr and others), inserted into the split ends of the fragments. The splitting apparently does no harm, and probably does good, as it opens up the ends of the bones into the marrow beyond the area where osteogenesis is at a standstill. In some cases no sutures or bone-nails are needed to hold the grafts in place, as the natural spring of the split fragments will hold the graft firmly. Usually, however, it is wise to drill small holes through both grafts and fragments and tie them together with chromic gut or kangaroo-tendon.

In conclusion, the writer believes that very few fractures will require open operation if they have had competent mechanical treatment, but that very few communities at present are provided with the requisite appliances and materials for the proper treatment of many of the common and disabling forms of fracture. He believes that all communities should be as well equipped for the treatment of fractured femurs as they are for the treatment of diphtheria or appendicitis.

122 South Michigan Avenue.

Discussion follows paper of Dr. Carroll, page 484

A GOOD METHOD OF TREATING SELECTED FRACTURES OF LONG BONES*

By W. Barnett Owen, M.D., F.A.C.S., Louisville, Ky.

The rapid progress in medicine and surgery during the last ten years, and the frequent employment of the roentgen ray, has necessitated more perfect reduction and maintenance of fragments in the treatment of fractures than had previously been required. Many of the mechanical methods hitherto suggested and employed were very complicated and some of them impractical, since they frequently necessitated a secondary surgical operation for the removal of non-absorbable material left in the tissues.

At the outset we want it clearly understood that we do not advocate the adoption of open operation in the treatment of any type of fracture if reduction and maintenance of reduction can be accomplished by the closed method. In some instances, even, it is advisable not to employ the open method if fair alignment and position can be obtained and in the surgeon's judgment satisfactory function can be expected. But it naturally follows that the more perfect the anatomic relation obtained the more satisfactory the function.

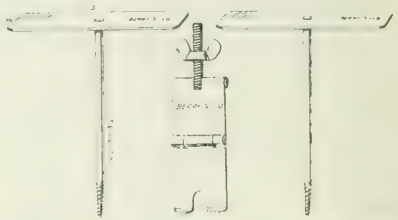


Fig. 1. Shows original instrument of Dr. H. H. Grant.

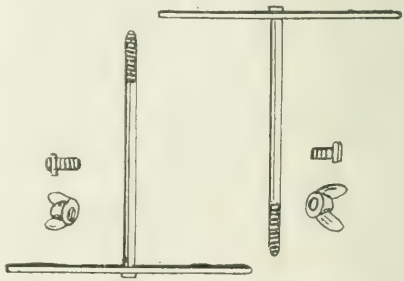


Fig. 2. Shows modification of Dr. Grant's gimlets which was suggested to me by Dr. Louis Frank.

The method of treating fractures which I wish to submit for your consideration is one devised by the late Dr. H. H. Grant, of Louisville, Ky., in 1915, and is known as the "gimlet fixation method." Dr. Grant's original article describing his procedure was published in the *American*

*Read in the Section on Orthopedic Surgery, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Arkansas, November 14-17, 1921.

Journal of Surgery, Vol. No. 31, April, 1917, p. 102. He reported seven cases consisting of the following:

(1) Fracture of the tibia.

(2) Fracture of both bones, middle of forearm.

(3) Fracture of the radius previously operated upon and silver wire used which had not held.

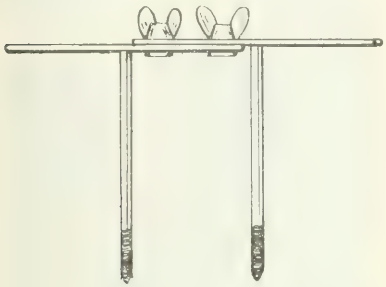


Fig. 3.—Shows modification of Dr. Grant's gimlets which was suggested to me by Dr. Louis Frank.

(4) Fracture of both femora.

(5) Ununited fracture of the humerus.

(6) Ununited fracture of the humerus.

(7) Fracture of fibula and femur of same leg.

In all of these cases firm union and good function resulted.

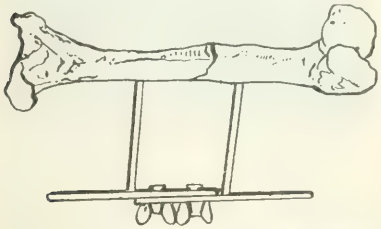


Fig. 4. Shows gimlets in position holding fracture.

Dr. E. S. Allen, of Louisville, has used this method of treatment in seven cases: two fractures of the femur, four of the humerus, and one of the radius and ulna. He reports good results in all but one in which there was a compound (multiple) fracture of the middle third of the femur.

Open operation was performed and twin gimlets used in two places. Infection occurred at the point of traumatic opening in the skin; delayed union of lower fracture. At the end of three months the patient slipped and fell, breaking his leg at the site of the lower fracture. Extension was employed and fair functional result obtained. Later report, September, 1921, stated that the patient was using a cane.

Dr. Louis Frank, of Louisville, has employed this method in six cases: three

Fig. 5.– Shows oblique fracture of femur.

fractures of the humerus, two of the femur, and one of the radius. He reports that there were no complications. Firm union and perfect function were obtained in every instance.

Dr. Guy P. Grigsby, of Louisville, has used this method in three instances: two fractures of the femur and one of the humerus. There was uninterrupted recovery in every case with firm union and perfect function.

Personally we have employed this method in eleven cases: two fractures of the humerus and nine of the femur. A mild infection occurred in one case of fracture of the femur, necessitating later

the removal of a small sequestrium. Union of the bone was firm and subsequent function good.

This patient was an acute alcoholic. He had a four-plus Wassermann (blood), and his general condition was exceedingly unfavorable when he was admitted to the hospital.

The results in the other ten cases were entirely satisfactory. There was firm union, good position and perfect function. Several other surgeons in our locality have been using the same method with results as good as those mentioned.

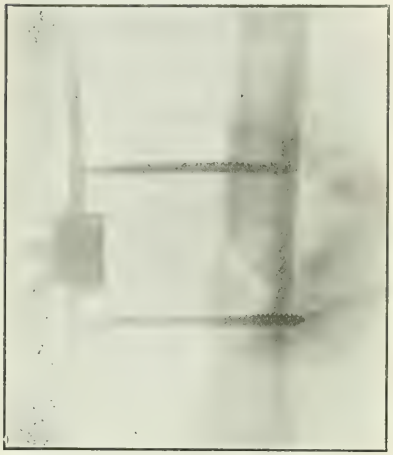


Fig. 6. Shows case No. 5 after operation.

This method of operation and fixation of the fragments appears to be more simple than other plans suggested and is equally efficient. It has the additional advantage that subsequent operation is not necessary for the removal of non-absorbable material. It does not interfere with osteogenesis. The gimlets are not left in position long enough to cause a rarefying ostitis and can be removed without the slightest pain.

We use the Hawley table in treating patients with fractures and apply a plaster spica following all such operations, covering the gimlets completely with the plaster dressing, providing a window for removal of the gimlets. Should there be occasion to change the dressing before the expected time, about six weeks, it can be easily accomplished without disturbing the position of the bones. In all cases x-ray pictures are taken after the operation.

In fractures of the humerus the dressing is changed much earlier, and passive motion instituted in elbow and shoulder.

Fig. 7. Shows fracture of femur.

This is done at the end of about two weeks, reapplying the splint until firm union has occurred.

CONCLUSIONS

(1) The gimlet method affords outside control of internal conditions.

(2) It is a simple and efficient method of maintaining reduction.

(3) Proper selection of suitable cases for treatment by this method is important.

(4) In no case should the patient be subjected to open operation if the fracture

can be successfully treated by the closed method.

(5) Restoration of function is the point of prime importance in the treatment of fractures.

Fig. 8. Shows case No. 7 after reduction. Picture taken through plaster dressing, rather indistinct.

(6) Rigid aseptic technic, adequate assistance, and proper equipment, are essential to success.

Discussion follows paper of Dr. Carroll, page 483.

TREATMENT AS APPLIED ON THE FRACTURE SERVICE OF CITY HOSPITAL, DALLAS, TEX.*

By W. B. Carroll, M.D.,
Dallas, Tex.

This report is based upon two hundred fractures in long bones treated during the past year at the City Hospital, Dallas, Tex. I attempted to make a report last year, but the records contained so little data relating to functional results that the work was abandoned. Such criticism, I dare say, can be made of many first-class institutions. During the past twelve months we have devoted considerable effort in following up the cases and to the House Surgeon, with the internes on service, is due the credit for most of the work.

In treatment we have avoided the use of elaborate equipment and have followed what is generally conceded the standard method for a given fracture. The teaching of such methods will remove the aversion felt by the average physician in assuming responsibility for these cases, because he will have a clear conception of a standard treatment and the results he may hope to obtain. I am convinced that the manner of presenting some excellent papers has in many instances given an erroneous impression. When one reads a paper on the "Traction Method," the next week on the "Open Method," and another on "Suspension Traction Method," or on the "Plaster Method," he finishes by having confused antagonistic ideas and does not get a comprehensive viewpoint when appraising a patient needing treatment. I like to regard these not as distinct methods, but as various means to accomplish the same end, namely, to reduce and fix a broken bone and restore an injured limb to usefulness.

Any treatment that is complete will include a careful regime for training muscles to resume function. This should not be left to the discretion of the patient as is usually done, but pursued under specific directions while the bone is uniting and subsequently until function is complete, or as nearly complete as the character of injury will permit. We have not had the advantage in our City Hospital of a therapy department, and for this reason our patients have been disabled 25% longer than similar cases treated in private practice.

Reviewing the cases briefly, with the aid of slides, I shall refer first to clavicle fractures. There were only ten: one three months' duration, ununited and bad position, was opened, ends freshened and kangaroo-tendon placed in drill holes to maintain position. Nine held by appliance to force the shoulders backward. Cosmetic results, good 5, fair 4. Our experience with the Sayre dressing has been unsatisfactory.

Fractures of upper end of humerus 18, treated by (1) closed method 13, with good

*Read in Section on Orthopedic Surgery, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

reduction 7, good functional results in 5; fair in 1; undetermined in 1. Reduction fair in 6; the functional results good in 4; fair in 2. Poor reduction in 1—fracture dislocation, not finished. Treated by (2) open method, 4. Reduction good in 3; fair in 1; the functional results good in 4.

One case fracture dislocation three weeks, opened, union progressing, mild attempt to reduce, failed, closed for firmer union, but patient, a Mexican woman, refused a second operation and left the Hospital with union but dislocation.

Fig. 2.—J. C. Before reduction.

Figs. 2 and 3 show the best reduction of the series, yet this girl, age 18, could not abduct above 90 degrees at eight weeks. Contrast this with Figs. 5, 6, 7 and 8 — fair reduction — and complete function at six weeks.

We use an abduction splint, the forearm piece reversible, and the arm piece prolonged to make an extension bar for light traction during the first week.

Fractures of shaft of humerus, 19. Compound fractures 3, 2 immediately operated upon with 1 good result and 1 with drainage, good at three months. One not opened, reduced under anesthetic, a good functional result.

Fig. 3.—J. C. Perfect reduction, but cannot abduct above 90 degrees at eight weeks.

Simple fractures 16, (1) using moulded splints, or Jones' method, in 4. Good reduction and good functional results in 2; fair reduction in 2, with 1 good functional

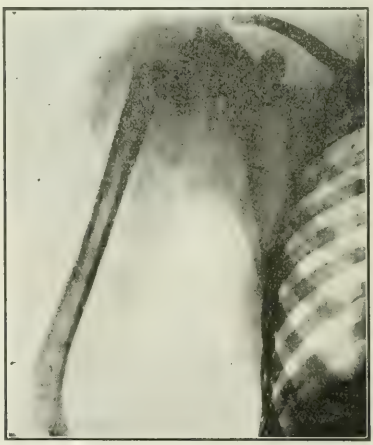


Fig. 5. T. W. Before reduction.

result and 1 fair functional result. (2) Abduction splint to side, with traction 1 week, 12. Reduction good in 8, with good function; fair in 3, with good function; poor in 1, with good function.

The last noted poor, Slide 15, at four weeks has deformity in arm and stiffness of elbow at 90 degrees. I moved the elbow under anesthetic and had him come to my office for therapy after three months' good function.

Fractures of elbow 15. (1) Olecranon one, in straight position with good results. (2) Acute flexion with adhesive plaster 14. Reduction good in 11 with good functional results in 7; fair in 6 with slight limitation. Reduction fair in 3 with good function.

Fig. 6.—T. W. Reduction fair, function complete six weeks.

Fractures of forearm. Shaft 21 and lower end 38, 2 epiphyseal separation, 16 Colles and 20 lower end.

All treated in plaster splints, the shaft cases in supination. The lower end fractures were reduced by the technic of Jones or Murphy.

The shaft cases, most of them children, had good reduction in 40 per cent, fair in 60 per cent. The functional result in these was generally good. So many of the forearm cases were lost, after removing the splints, a detail of the results is impossible.

Fractures of neck of femur 15. One 92 years old treated with Whitman's abduction method for three months and in wheel chair nine months. The patient died with only fibrous union. One 86 years old with abduction splint for six weeks; died from pneumonia. One 80 years old treated by Thomas' abduction frame for two months; died from exhaustion. Three patients near 70 years of age treated with plaster-of-Paris by Whitman method with 2 good results and 1 undetermined, now four months' duration with doubtful results, probably non-union. Five between 40 and 60 years by Whitman's plaster method, 2 good results, 1 weighing 240 pounds developed pneumonia and probably has fibrous union. Two patients, too early to determine results. Three between 30 and 45 years with the Whitman plaster method produced good results. One 40 years old, non-union following Albee operation, now in plaster cast. One fractured acetabulum with central dislocation of the head.

Our routine treatment is reduction under an anesthetic on the fracture table and the application of plaster in the Whitman position for three months. Then walking on caliper splint for three to six months.

Fractures of shaft of femur 32. (1) Open operation 7; 1 plate, oblique fracture, good result. Plate in leg 1 year with no symptoms. Three beef bone grafts with good result. (See Figures 8-9). Three non-fixation cases with good result. All submitted to skin traction 5 to 6 days before operation. (2) Traction in 24 cases. Tong, Pierson's method, 3 transverse fractures with good results; 1 oblique fracture with good result. Skin to elevated bar 2; 1 oblique, 1 transverse with good function in both. Modified Thomas' splint in 18; compound fracture 3, with functional results good in 2 and non-union in 1; transverse fracture in 9 with good function in 6 and fair in 3; oblique fracture 6, with fair function, ½ to 1 inch shortening. (3) Plaster method 1, child 7, transverse fracture, reduction and plaster cast.

SUMMARY

Thirty-two cases. Nine oblique or spiral, 1 operation, short ¼ to 1 inch, average ½ inch; 23 transverse and slightly oblique; 6 opr., short 0 to ½ inch, average ¼ inch. Results good 27, fair 5, poor 1.

Fig. 7.—T. W. Reduction fair; function complete six weeks.

The routine for shaft of femurs is to place the patient immediately in a Thomas splint and have radiogram made, when satisfactory, as is frequently true in oblique fractures the splint is not changed, but made more comfortable by suspension, and on occasions by traction from the foot piece over a pulley as in the manner of a Hodgen splint. If, however, there is overriding the patient is anesthetized on a fracture table, the leg is shaved and straps applied so that traction can be transferred

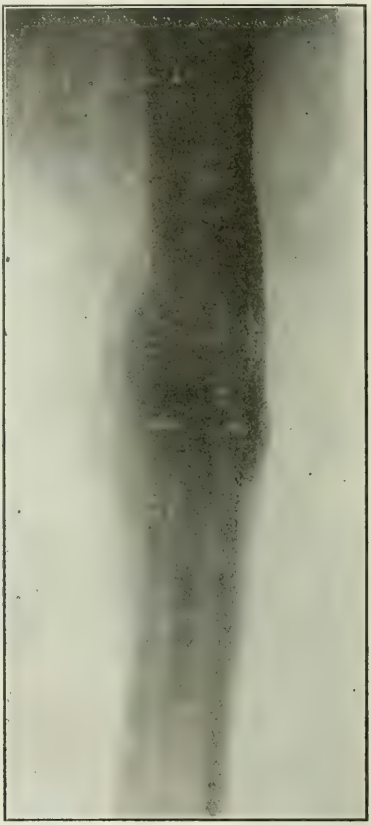


Fig. 8.—Intramedullary beef bone, femur three months after operation.

from the table to the splint after reduction has been made. On the fifth day an x-ray check is made and if skin traction has not been adequate the patient is advised either to have an open operation or to have skeletal traction. Practically all fractures in

any part of the shaft can be successfully treated by traction applied directly to the bone. The Thomas splint we use is made with an additional piece from the knee down for knee flexion and has a pulley attached at end for weight traction if desired.

Fig. 9. Beef bone plate and screws, femur nine months after operation.

The fractures of tibia and fibula, thirty-six in number, were not of great interest. They were reduced and put up in plaster, splints preferable, with some shortening in a few, but fairly good results. When overriding persists we apply traction on the oscalcis, but only one required it in this series.

Fig. 10. One year after fracture complete function.

Fig. 11. Two years after fracture, complete function.

DISCUSSION

Papers of Drs. Ryerson, Owen and Carroll.

Dr. Earl D. McBride, Oklahoma City, Okla.— I try to impress upon my patients with fractures that they are sick individuals. The day has passed when a doctor can take hold of a man's wrist with Colles' fracture and say, "I will fix

this up in a little bit," jerk on it, put on a few splints and pass the patient on.

The anesthetic, the x-ray and other adjuncts are being emphasized more and more. We see less bad results in these cases than we used to.

There is no standard method of treatment of fractures, and when a fracture must be opened there are various methods of treatment. A fracture may be a simple one where the ends are in apposition, and where there is fibrous union. In that case there is no necessity of putting in a graft. We can remove the fibrous tissue which will be all that is necessary. The less foreign bodies we leave in, no matter whether it be the autogenous or beef-bone graft, the better will be our success in treatment. There are cases in which perhaps the skin is infected. It may not be a compound fracture, but the skin may be infected or there may be several abrasions in which we are apt to infect the bone in case we open the fracture. In that case, if the fracture can be held without opening the skin, so much the better. If it must be opened we must select that method which will be the most likely to leave us a very clean bone.

I like the splint Dr. Owen has presented to us, because it fills a long-felt want for maintaining apposition in long bones in fresh fracture cases, that is, cases where the bone will stay in place if we put on plaster, or may stay in place where we put on a Thomas splint, but which we feel are apt to slip. In these cases where we feel a fracture does not need an open operation we can maintain the fragments in apposition and put on this gimlet splint he has described, put on our dressing, put plaster over that, and later on remove it without fear of having necrosed bone or any of the rarefying conditions. I do not think it would be indicated in the presence of sepsis, particularly where the bones or the fragments are lacerated. While I use beef-bone in all these cases, I feel it ought to be left out wherever we can.

Dr. John T. O'Ferrall, New Orleans, La.—I would like to support what Dr. Ryerson has said in regard to the Whitman abduction method of treatment of fractures of the hip and surgical neck. My experience has been that the average practitioner over the country, and even many of the better surgeons, are skeptical as to the use of this method. They have not apparently thought enough of it to try it out, and a great many know very little about it. An effort should be made on the part of all of us to popularize the method. In my section of the country I do not believe I have ever seen a plaster spica applied in the Whitman abduction position except those I have applied myself. If you tell the general surgeon that this method can be used and the patient gotten up within a few days after its application, he will not believe it. He wants to know how the patient is going to walk with the thigh in extreme abduction.

The splint shown by Dr. Owen is a very useful one. It is similar to other splints of that type used by Heygrove and Putti, which are considerably more complicated, and is particularly applicable in cases of fracture of the middle third of the femur. The one Dr. Owen has shown can be used more readily in small bones than in the larger bones.

Dr. F. W. Carruthers, Little Rock, Ark.—The treatment of fractures depends on the position and kind of fracture. In fractures of the hip as a whole the Whitman abduction method to my mind is the most standard method of handling fracture of that kind. Next question that might arise is whether the patient is of the operable or inoperable class. Personally, I am of the opinion of Dr. Whitman that there is no age limit to repair. The primary question is absolute rest and fixation, and without doubt this is thoroughly accomplished when you use the Whitman abduction plaster spica.

When it comes to the question of autoplastic surgery I firmly believe Dr. Ryerson has given us more data than any one else, and he should be highly complimented for his contribution to surgery in this line.

We should by all means standardize our work as far as possible, and use the method with which we can obtain the best functional result.

The time for securing a perfect result is another question. It is said that patients are not able to walk within a few months. If you have patients with fractures of the hip, who are able to walk within eight or twelve months, you are very lucky.

Dr. Robert T. Pirtle, Louisville, Ky.—The Whitman method seems to be very popular, and, as Dr. Ryerson says, the Whitman method is very useful in treating fractures of the neck of the femur. I had a record case of this kind at the City Hospital in Louisville about a year ago. An old woman was brought in who was said to be 106 years of age. This sounds a little odd and hard to believe. However, she had a daughter 75 years of age, who was too old to come to see her. Notwithstanding the protest of the City Hospital internes, I resorted in this case to the Whitman abduction method, putting on a very comfortably fitting spica, and I got good reduction, which the x-ray plate showed. She received one dose of morphin when she was brought in and did not have any more. She did remarkably well. After six weeks the plaster-of-Paris spica was removed and an x-ray picture showed callus formation. Examination showed union as she was able to move her leg in any position she chose without pain. One morning about ten weeks after the injury after eating a hearty breakfast and smoking her pipe she suddenly fell back dead. No post-mortem was held, but evidently she had an embolus. Some one suggested that she might have died of old age.

I had the pleasure of seeing Dr. Ryerson's case last November with the intramedullary peg. We have one now that is giving us trouble, and we may have to put one of these in.

I am very familiar with the treatment Dr. Owen has described with the gimlet splint which we have used with great satisfaction. In Dr. Carroll's cases of fractures of the upper end of the humerus he used abduction metal splints. We have treated these cases successfully with plain plaster-of-Paris spicas and put them in any position we want to. They handle themselves very nicely and the fixation is so complete that

they have very little pain, they seem very comfortable.

I have had very little experience with the Parham band. The only case I have seen where it was used had a rarefying osteitis and it was necessary to remove the band. It seems that this band was gotten up to use especially in spiral fractures, as this was the type of fracture from which we removed the band. There was non-union, which I cannot lay to the band, as since then the bones have been freshened up and held in place with Grant's pins without any callus forming. I am glad to hear Dr. Ryerson state that he uses square pegs and round holes, as this makes the matter of pegging hips a great deal easier.

We have taught ourselves to fix a round hole with a round peg. If you get a graft larger than the hole and drive it in tight, it is better than the round. The wedge effect holds it absolutely in place.

Dr. George A. Hendon, Louisville, Ky.—I wish to address myself to the consideration of the treatment of fractures of the thigh, including intracapsular fractures, subtrochanteric fractures and fractures of the shaft, and I wish to bring to your notice a measure which has the recommendation of simplicity. I have not used any plaster-of-Paris on any fracture above the condyle except a supracondylar fracture. My method has been to use a suspension splint, devised and modified by the late Dr. George Brown, of Birmingham, Ala., and demonstrated by him before the Southern Surgical Association in New Orleans in 1907. It is a simple appliance and it does not require any anesthetic. It puts the leg in proper anatomical position and relaxes the muscles in such a way that the two fragments seem to find each other naturally. The patients are always comfortable and it is a great help and convenience to nurses. The patients can be moved about in bed and turned on their sides and assume almost any position they want to without disturbing the relationship of the fragments. In an experience of about twenty cases I have had no reason to discard the method. In fact, they have all been successful cases. None of my old people with intracapsular fractures have had pneumonia or pulmonary complications which are so likely to occur in conjunction with the application of plaster-of-Paris. This is a mere suspension apparatus made of light wire and lined with canvas which I shall not describe. It has to be seen to be comprehended. If any of you are sufficiently interested, you can get the published volumes of the *Transactions of the Southern Surgical Association* and find a complete description of the outfit in the 1907 number. The apparatus is cheap. It only costs two or three dollars to make it and the results are entirely satisfactory. I have never been disposed to resort to gimlet fixation, to the open operation, or to any of the more complicated and dangerous forms of treatment.

Dr. Louis Frank, Louisville, Ky.—As a general surgeon, I would like to say a word or two on this subject of the treatment of fractures. Fortunately, we are so situated that most of our fractures are seen by Drs. Owen and Pirtle. We are, therefore, not subjected to many of the annoyances and troubles and difficulties that beset the average general surgeon in the treatment of fractures.

In association with these gentlemen we have seen a number of cases of fractures of the hip that have been treated by the Whitman method, and so far as we can see it answers every purpose, and we can see no advantage in any form of splint over this method in preventing the development of pneumonia or giving the patients comfort and relief from pain. The thought struck me that if Dr. George Brown's splint has such wonderful specific power and virtue in the prevention of pneumonia we might use it in many individuals to obviate this terrible complication which we so often see, especially in elderly people. As a terminal disease, it might by the use of this splint, be entirely done away with.

With reference to the treatment of fractures, I personally believe that every surgeon ought to be able to treat a fracture. If he is not able so to do, he is not a surgeon. We recognize the fact that there is a great deal of operating being done, and that possibly surgical cases are treated by men who are somewhat more operators than they are surgeons. But every real surgeon should be capable of treating fractures. We also know that a great deal of industrial work and much railroad surgery is being done by men who are really not surgeons. Be that as it may, we think it is best that fractures should be treated by men especially engaged in this work because they undoubtedly have attained greater proficiency and so are situated that they can give many of these cases the time and attention necessary to achieve the most successful results. Therefore, we have our associates, Drs. Owen and Pirtle, see all our fracture cases direct. We agree with one of the speakers that fractures are best treated in a hospital, but we also recognize the fact that this is not always possible. If one is so situated that a fracture case can be taken into a hospital, that is the place for it. We are also sure that unnecessary operations are done in the treatment of fractures, and a great deal of discomfort to the patient and mental perturbation upon the part of the surgeon occurs as a result of attempting to get perfect anatomical restoration of the fractured bone. It is not the anatomical results we want, but the functional results, and I think if we bear this in mind that possibly some good may be done and we shall not resort to the open treatment of fractures so frequently as has been done in the past.

Our experience with the device of Dr. Grant as shown by the essayist has been very satisfactory. The simplicity of the device appeals to one. There are certain types of fractures in which it may be used to great advantage, and we are sure that if those of you who have not used it will employ it in suitable cases you will be just as well pleased with it as we are.

We have used bone plates, silver wire, inlays, pegs and all the various methods and devices in the treatment of fractures, but in certain types we believe this simple appliance answers every purpose and is the best thing that can be used in the particular type of fracture to which it is adapted.

Dr. Henry G. Hill, Memphis, Tenn.—Many of us who practice orthopedic surgery look upon Dr. Ryerson, Dr. Whitman and a few others as authorities on the treatment of fractures.

I was somewhat surprised to know that Dr. Ryerson advocates the use of the intramedullary bone graft. Recently I had occasion to discuss the advisability of using the intramedullary graft in certain fractures where open fixation of the fragments was necessary, with Drs. Baer, MacAusland and Albee. They advised against its use, all being very decided in their views, in favor of the inlay or cortical graft.

It is hard for us little fellows to know just whom to follow when our pathfinders differ so widely in their opinions.

I would not care to go on record as disapproving anything that Dr. Ryerson has had to say in this connection. It is simply a question of one authority's being able to get results one way and another's accomplishing the same thing by using a different method.

During the past two years I have seen two failures where the intramedullary bone graft was used in fractures of the shaft of the femur. One of these cases had a perfect alignment of the fragments when he left the hospital. Four months later, while walking, the bone suddenly angulated to a very marked degree. The patient was again taken to the hospital and the graft, apparently a sequestrum, was removed. There was a well-formed involucrum surrounding it. A firm, bony union followed the removal of the graft and curettement of its bed. The other case that I have in mind where the fragments of a fractured femur failed to unite following intramedullary grafting occurred in a young man 17 years of age with a transverse fracture in the upper third of the femur. Five or six months after operation there was no union. The roentgenological appearance of the fragments was that of a rather typical non-union, namely, rarefication of the bone near line of the fracture with a dense, ebony-like formation covering the end of the fracture. The graft was removed in this case and the sclerotic tissue chiseled from the end of the fragments. A firm, bony union followed.

We all know that good results are obtained by the use of the intramedullary bone graft; but I do believe that the percentage of failures is higher following its use than is the case when the inlay graft is properly used.

I believe that rarely, if ever, is there an indication for the use of metallic or non-absorbable material in the treatment of fractures in the shaft of the bones.

There is one other point that I should like to ask Dr. Ryerson to bring out in his closing remark: whether or not in classifying his cases of fractures of the neck of the femur he can always say that a case is intracapsular or extracapsular, as the case may be. Preston, of Denver, claims that he has been able to show by post-mortem dissections that in a great many of the so-called intracapsular fractures the fracture was both intra and extra capsular, the line of fracture passing through the capsular attachment.

Dr. Isidore Cohn, New Orleans, La.—I should like to call the attention of Dr. O'Ferrall to the fact that he had to come to Hot Springs to know that about ten years ago I published in the *New Orleans Medical and Surgical Journal* an article on the Whitman method of treatment of fractures of the neck of the femur. The last patient treated by this method was a woman, 79 years of age, with a blood pressure of 240 and myocarditis. I first saw her three weeks after the fracture. The patient was not put on a Hawley table. We made use of the Hugh McKenna table and the woman, after eight or nine months, was able to walk.

In order to reduce a fracture or any deformity we should know the direction of muscle pull, making our traction or pull in the direction opposite to that in which the muscle contraction is producing deformity.

Another point of great interest that strikes one is that there have been misinterpretations of x-ray pictures in the young. I have been carrying on studies along this line for the last two years. A part of this work has been published in the *Archives of Surgery*. One point extremely valuable in looking at a picture after supposed reduction (supra-condyloid fracture of the humerus) is, if the capitellum is overlapping the cavity of the great sigmoid notch, you can say there is a deformity, and unless you overcome that you will have a cubo valgus or a cubo varus.

In regard to the Parham-Martin band, Dr. Parham related his experience at the Clinical Congress and stated that a great many men were using the band in cases of oblique fractures of the femur. Along these lines I have not heard mention of the Pierson modified Thomas splint which enables us to have a movable knee in fractures of the femur.

Regarding the intramedullary graft, I am very sorry I have to take issue with Dr. Ryerson. In some experimental work we have done in the last ten years it was our observation that most of the callus came from the endosteum. It did not come from the ends of the bone. It is simply like a volcanic eruption from within out. If you are pressing on that you will have pressure atrophy, interfering with the blood supply of these new-forming osteoblasts.

Just one more word in regard to fractures of both bones of the forearm. A splint has been suggested by Dr. Hey Groves, by the use of which one can make traction and avoid the necessity of an open operation. A great many open operations are done because practitioners do not know how to treat cases along anatomical lines.

Dr. Willis C. Campbell, Memphis, Tenn.—There is a vast difference in prognosis between those fractures of the neck proper, central or intracapsular, and those occurring about the trochanter. The latter unite by nearly any proper mechanical method, whether the Whitman, Hodgens splint or even Buck's extension. In central fractures I am an advocate of the Whitman procedure, by which I have been able to obtain solid bony union in 90 per cent, as discussed in a recent paper before the Nashville Academy of Medicine, when 160 cases of fractures of this region were analyzed. I cannot too

strongly condemn the Hodgens splint as being most inefficient and unreliable in central fractures of the neck of the femur. I have had occasion to see quite a number treated by the Hodgens splint, all of which were ununited.

In ununited fractures I have employed bone graft from the tibia with excellent results in all cases, when non-union has not existed over one year. It is my rule, if condition of patient permits, to use this method at the end of two months if no union has occurred. The earlier the graft is inserted the better the prognosis. This can be done by small incision under x-ray control in the operating room. A series of plates are made as the operation progresses. The fluoroscope in this region does not give sufficient definition. I have not found beef bone, nails or any foreign material satisfactory. Drainage is unnecessary. There has been no infection in over 30 cases.

Dr. Ryerson (closing).—Several of the speakers have criticised my idea that every community ought to have the materials on hand and some one who is able to use them to take care of these fractures of the hip. Despite this criticism, I wish to reiterate my belief in this idea, because every year I see several poor men and women brought in at great expense from far out in the country to have an open operation performed for the repair of an ununited fracture through the neck of the femur.

Dr. Campbell has told us that he has secured solid bony union in 90 per cent of his cases treated by the Whitman method, and I do not hesitate to say that many of these cases could have been cured just as easily by any general practitioner or gynecologist or obstetrician who had taken the time to become familiar with Whitman's simple technic, and who had the requisite materials. It is much easier to acquire this technic than to learn many of the other things that have become every-day matters to all of us.

I am simply putting in a plea for poor people in sections of the country where there are no hospitals and no practitioners who are especially trained to take care of these cases, and I shall say again that they can readily be cured by any doctor who has learned how to pull down on the legs, lift up the trochanter, abduct the legs widely and put on a long plaster cast.

I should be the last man in the world to decry the advantages of having all severe fractures treated in a hospital by competent surgeons, and this should always be done when it is possible, but frequently it is not possible or at least not practicable.

Dr. McBride has spoken of performing open reduction in fractures which cannot be reduced by bloodless methods and then putting them up without any form of internal fixation. I have tried this in fractures of the forearm and of the femur, with results that were far from satisfactory. Some of the overriding recurred, as the indentations of the fragments did not lock with sufficient firmness to prevent shortening. If the fragments of a broken long bone can be held end to end, the tendency to angulation and shortening can be easily controlled by external apparatus, such as splints or casts. It is much more difficult to overcome shortening by traction than by direct pressure, provided the broken ends are fixed together. This observation applies particularly to fractures in the middle of the femur, and it is here that the intramedullary bone peg is especially useful. I shall speak of this in more detail a little later.

In regard to Dr. Pirtle's case, a woman 106 years of age, I was familiar with it from the article which he published. It shows that even very aged people can be comfortably treated by Whitman's method. It is interesting to note that she only received and needed a single dose of morphin while she was in the hospital. These patients are much less liable to develop pneumonia if they can be propped up in bed in a cast, or even get about in a wheeled chair or with crutches.

With reference to the proposition of impacting a fracture after you have reduced it, that point was brought out by F. J. Cotton and is useful in some cases, but it is not necessary to do this when Whitman's abducted position is used, because the mere fact of abducting the legs to the limit presses the neck against the head with sufficient firmness.

As to "intracapsular" fractures, I deliberately put that in quotation marks. The term is deservedly becoming obsolete. Fractures at the base of the neck get well readily with simple traction or in a cast with moderate abduction. Fractures through the small part of the neck of the femur are extremely difficult to handle except by the Whitman method.

In regard to the intramedullary splints, I would not tell you that they are satisfactory unless I absolutely knew that this is true. In their own field and under the proper indications they are extremely useful. They should not be used in old, ununited fractures, in fractures with much comminution, or in some of the oblique fractures. They simply serve as a means of preventing lateral displacement and overriding in fresh fractures, especially in the middle of the femur and in both bones of the forearm. They are readily placed in position and are much stronger mechanically than any inlay graft fastened in a groove with kangaroo-tendon or any beef bone plate or autogenous graft fastened with beef bone screws. Theoretically, they may interfere with the intramedullary circulation, but what difference does this make if the fracture goes on to solid union? It is possible that this circulatory interference may make the union slower, but if this is true, I have not observed it.

One of the surgeons in the discussion spoke of a case where, after the use of such a peg, gradual destruction of bone occurred with non-union. Let me point out that the same thing sometimes occurs where no bone peg or any other operative procedure has been used. Let me also mention that all femur fractures need a long period of protection while healing, and that weight-bearing without external apparatus must be forbidden until absolute bony consolidation has taken place. This is usually nearer four months than three.

A few years ago I had under treatment two instructive cases of fracture through the middle of the humerus, one a young man of 22 and the

other a man of 50. Both were operated upon early and the bones wired together, but no union resulted. Both of them then had Albee inlay autogenous grafts fastened in with kangaroo-tendon with failure of union. Both patients were then sent to me and I put in each a very long Albee inlay graft, fastened with beef bone pegs. Firm union apparently took place, but in a year the arms were again flail, with complete failure of union. I then made a long intramedullary splint from the tibia and ran it from the elbow to the top of the humerus, the whole length of the intramedullary canal. The younger man rapidly obtained a solid and permanent union, which is still perfect after three years. The older man, after a year of apparent union, again came back with a flail arm. His insurance company settled with him on the basis of a "lost" arm, but he wanted one more attempt at union. I abandoned hope of preserving the normal length of the humerus, overlapped the ends by the "step-cut" method and wired the bones together with iron wire, a thing which I had not done for many years. The result was a rapid and perfect union with excellent callus formation, and the arm has remained strong and useful for two years. It is probable that the age of the individual has a distinct bearing upon the osteogenetic reparative processes.

One advantage of the intramedullary peg is that it allows the ends of the fragments to become pressed against each other by the pull of the muscles, which unquestionably promotes union. This is not the case with the Lane plate, the beef bone plate or the autogenous graft fastened with bone screws. It is hardly necessary to state that a beef bone intramedullary peg should never be used where it is desired to fill up a gap created by loss of an entire section of a long bone. Only autogenous grafts should be used in such cases, and the failures are somewhat more numerous than the successes.

Intramedullary pegs are not to be used in fractures where a complete section of bone has been broken out and displaced. I had a case last year where a three-inch section of the whole thickness of the femur had been completely displaced. An eight-screw Lane plate was applied with a perfect result.

Please bear in mind that I am not advocating any single method to the exclusion of other methods. I use them all for the especial classes of cases in which they are most suitable. I am only attempting to show that for certain well-defined and sharply limited varieties of fractures the intramedullary bone peg is simpler, stronger and safer than some of the more widely-advertised procedures.

The gimlet fixation method mentioned by several of the speakers is very ingenious and is similar in principle to the Lambotte clamp. H. R. Allen has advocated the use of steel wire drills, passing entirely through the bones and projecting on both sides of the arm or leg, both above and below the fracture, these drills being then fastened together by bars of special soldering material. It is, of course, somewhat risky to have metal pins or gimlets passing through the skin on account of the danger of infection, but after all the danger is slight and the advantages in some cases of this form of fixation are very great.

Dr. Owen (closing).—I have never had any experience with the use of bone pegs and I feel that Dr. Ryerson's experience must have justified him in continuing their use as long as his results are as good as they have been. Those of us who have used this gimlet devised by Dr. Grant are convinced by the variety of cases that the procedure is worth while.

There is one point in Dr. Ryerson's classification that I would like to refer to. I happen to have with me a lantern slide illustrating one case in which there was a fracture of the neck of the femur. The patient was a man, 65 years of age, and the fracture was reduced under a general anesthetic, to which we resort in all such cases in a hospital on the Hawley table. I agree with Dr. Ryerson that where it is not possible to take these cases into a hospital and have a specialist in that particular branch handle them, they require treatment by a man who will not hesitate to try the method and familiarize himself with the simple method of reducing these cases and of giving an opportunity for union to take place.

This picture shows clearly a fracture of the neck of the femur with outward rotation which is extreme. The other picture shows the same case after reduction and rotation is done. The next picture shows the way we handle these cases now where we have a good hospital.

Another picture of the same case will show how it is very easy to turn these cases on the side, back and face. We move cases frequently for the prevention of pneumonia and pressure sores.

This represents a front view showing how easily it can be managed. It is remarkable what the patient himself can do in helping the nurse to turn him and raise himself in bed, and the good of doing that prevents subsequent depletion and atrophy of the musculature generally. He is more able to stand and walk when the time comes than he would be if it were not for the fact that he has had a certain amount of exercise, and where it is possible to have friends give sufficient attention, and when it is not practicable to have a nurse we have a member of the family go through a recital of the motions of the other part of the body which is accessible to keep up the strength and take sufficient exercise to enable him to handle himself. At the end of two months in old people we cut the plaster from the knee down, leaving a spica from there on up, and allow these cases to walk on crutches. I have never been able to have them walk very well. However, one or two cases I can recall could walk very well with a long plaster spica with this extreme abduction.

I wish to congratulate Dr. Carroll on his conservatism. The pendulum has swung both ways in the matter of radicalism and conservatism. For a time practically all cases were operated upon by men who were very enthusiastic. Then the pendulum swung until only certain selected cases were operated upon that could not be successfully reduced and maintained properly in order to get a functional result. Yet it is not absolutely necessary in every instance to get

perfect anatomical alignment, and we know that a functional result is very much better where it is possible to obtain it.

Dr. Carroll (closing).—The beef bone fixation method of Dr. Ryerson has the advantage of simplicity. By making a small V-shaped notch in one fragment and introducing the peg in the other, the notch gives access to the peg, which can be driven in place with a small chisel. There is the theoretical objection of disturbing the blood supply in the medullary canal, but I have not observed any delay in union in more than a dozen early fractures where it was used. I do not hesitate to close the wound without any fixation in transverse fractures if the fragments lock and the plaster can be applied without a change of position on the table.

I am surprised that caliper traction has not been referred to in the discussion. In adults there are many femurs which cannot be brought into apposition with skin traction and are easily reduced by direct skeletal traction. Some of these were shown on the slides.

A working knowledge with all methods of reduction and fixation is necessary, but let us have a general plan of procedure, or a standardization of fracture treatment. If the routine is not adequate then the more specialized methods can be followed.

THE TREATMENT OF CANCER OF THE UTERUS WITH RADIUM*

By Louis Frank, M.D., F.A.C.S.,
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No problem of greater importance confronts the medical profession today than the treatment of malignant disease. That cancer is steadily increasing in all civilized countries there can be no doubt. This cannot be explained except in small part by improvement and greater accuracy in statistical returns. This increase is stated as approximately 2.5 per cent annually. In a pamphlet issued by the American Society for the Control of Cancer it is stated that during the two and a half years in which we participated in the World War eighty thousand soldiers were killed or died of disease. During the same period in the United States one hundred and eighty thousand persons perished from cancer, much of this representing a needless sacrifice of human life. The Bureau of Vital Statistics estimates that in 1920 the death rate from all varieties of cancer in the continental United States was ninety thousand. It is quite probable that more complete and accurate returns would have increased the number to one hundred thousand. The mortality rate for cancer in the United States is eighty-five per one hundred thousand, ranking with kidney disease, tuberculosis and pneumonia as one of the five or six chief diseases (second only to heart disease) as a cause of death.

Of the total cancer deaths, those involving the female generative organs (including the mammary glands) account for proportionately the greater number. This group embraces only about 50 per cent of the population. Including both sexes, the greatest number of deaths occur from cancer of the stomach (including the liver), viz., thirty-five thousand; the female generative organs account for thirteen thousand; the breast for eight thousand five hundred; the mouth and tongue three thousand five hundred; the peritoneum (including large and small intestine and rectum) twelve thousand; the skin, three thousand five hundred; other organs, fourteen thousand five hundred.

Statistics show that beyond the age of forty years one woman in every eight is fatally attacked by cancer, whereas one man in thirteen dies of this disease. Between the ages of thirty-five and forty-five three times as many women as men die of cancer, and in the decade from forty-five to fifty-five twice as many women as men succumb. While reports indicate that the white race is more frequently attacked by genital cancer than the black, this is not in accord with our own personal experience. In the wards of the Louisville City Hospital during the last thirty years, where the beds are equally divided between the white and black races, we have observed as many uterine cancers in blacks as in whites.

A six months' survey (January 1 to July 31, 1921), of our clinic in one private hospital, including the work of our associates, shows twelve hundred and ninety-nine admissions, thirty-one of which were readmissions, thus giving the net new patients twelve hundred and six-

*Read in Section on Surgery, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

ty-eight. Of this number, eighty-three were admitted for malignancy, six of which were sarcomata, twenty-seven some form of carcinoma. Of these patients, fifty were females and thirty-three males. Of thirty-two females the uterus was involved in nineteen, the breast in thirteen. There were twenty cases of cancer of the intestines, stomach, rectum and liver, thirteen occurring in women and seven in men. Another group of five women and twenty-one men showed six with cancer of the cheek, six of the lip, three of the nose, three of the eyelid, one of the antrum, two of the mouth, two of the tonsil, one of the throat, one of the neck, and one of the chest wall. Of five men with cancer, the hand was involved in one, the prostate gland in two, the heel in one, and the inguinal glands in one. Thus it may be seen that malignant disease is relatively more common in women than in men, and this is explained by the greater frequency of its occurrence in the genital organs and breast.

In a discussion of uterine cancer that of the cervix is of predominant importance. It has been our observation that cervical cancer is a disease found almost exclusively in the married, i. e., in childbearing women. Cancer of the corpus we have seen just as often in the unmarried. Most of the women with cervical cancer have given birth to several children. It is worthy of note that the incidence of uterine cancer is greater in women who have fibromyomata than in those who have not. Noble states the evidence is overwhelming that uterine fibromyoma leads to carcinoma; not that it becomes a carcinoma, but the presence of the tumor exerts an influence upon uterine nutrition (or an influence upon nutrition which we do not understand) and as a matter of fact carcinoma develops, particularly carcinoma of the corpus. According to Winter, fibromyomata are a direct cause of carcinoma of the corpus uteri; and Piquand claims the evidence is convincing that fibromyomata are a direct cause of carcinoma of the cervix. Of three thousand seven hundred and eighty-six patients with fibromyomata uteri mentioned by Noble and Cullen, one hundred and twenty-four also had corporeal or cervical carcinoma, i. e., slightly more than 3 per cent. Winter cites twelve hundred and seven cases of fibromyomata uteri with cervical carcinoma in twenty-five, or about 2 per cent. Study of available statistics induces the conviction that approximately 2½ per cent of cases of fibromyomata are sooner or later complicated by carcinoma of the uterine corpus or cervix.

Rarely cervical cancer develops after supravaginal hysterectomy for fibromyoma or inflammatory diseases. We have observed six such cases during the last four years which developed at variable periods of six months to twenty years following supravaginal hysterectomy for fibromyoma. One of these undoubtedly had cervical cancer at the time of her hysterectomy for myoma. We have seen one case of cervical cancer in a woman whose husband later developed carcinoma of the glans penis. We are positively of the opinion, however, notwithstanding the recent statement of Ochsner that he has "isolated the germ of cancer," that cancer is neither contagious nor hereditary, nor do we believe in "cancer houses" or "cancer villages."

There is no doubt that childbirth injuries and stimulation of the mammary glands by lactation and menstruation account in large measure for the frequency with which the breast and genital organs are attacked. Our first concern, therefore, should be to treat patients with child-bed injuries during the precancerous stage and in so far as the cervix is concerned, thus prevent development of the disease. This consists of the repair of indurated and eroded cervical lacerations, the excision of inverted and indurated scars, the amputation of chronically eroded and hypertrophied cervices.

We believe if all women presenting any of these so-called precancerous lesions were treated as outlined, or could be kept under constant observation, very few cervical or uterine carcinomata would occur and fewer lives would be lost from this horrible disease. Furthermore, all tissues removed at such operations and all curettings should be subjected to histological

examination by a competent pathologist. Some believe when cervical cancer can be diagnosed without the aid of the microscope that the disease has passed beyond the possibility of relief by radical surgical procedure. We do not concur in this opinion, but one must be impressed by the tremendous number of ultimate deaths following surgery if even one competent surgeon of experience gives utterance to such an expression. It behooves us to study the very earliest symptoms of the disease. The classical text book signs, the great cancer triad, hemorrhage, discharge and pain are terminal symptoms. If we await the appearance of these, then certainly the case has entered the borderline stage of not only curability but operability, and most frequently has become utterly hopeless from any standpoint.

Lynch believes, from his study of the mass of material as he sees it, that the profession is doing little toward improving the cancer situation, and that in the hands of men doing surgery the disease is quite as hopeless as it was years ago. He thinks cancer of the cervix is the great problem. Samuel also sorrowfully holds the profession to blame for the hopeless inoperable cases as seen by the surgeon, and says that 80 per cent of the patients who come to him are utterly hopeless because of metastasis, the parametrium and the iliac glands being involved when he first sees them.

We believe the educational campaign which has been in progress during the last few years, particularly statements emanating from the American Society for the Control of Cancer, some of which have been reproduced in lay periodicals, should be actively continued and especial attention be directed to cancer of the breast and uterus. Physicians, also laymen and laywomen, should be taught that a watery vaginal discharge is of significance, that intermenstrual bleeding, no matter how slight, particularly in women of thirty-five or over, should also be viewed with suspicion. Bleeding following coitus or a vaginal douche in a woman beyond thirty-five should demand immediate investigation, careful study and observation. The slightest irregularity or the least recurrence of the menstrual flow after the menopause should be viewed with alarm. The physician's duty to his patient demands that he investigate and determine the source of the bleeding or discharge. If it is from the cervix, the uterus, or from an erosion which bleeds ever so little upon manipulation, a microscopic study should be made.

Copious hemorrhage means ulceration, odorous discharge denotes sloughing, pain indicates extension of the disease beyond the uterus with nerve pressure from the neoplasm, the sum total of which indicates that the disease has probably entered its terminal stage and little, if anything, can be promised the patient. Early diagnosis, therefore, is essential if treatment is to be of avail.

"To make a positive diagnosis of cancer of the uterus an internal examination by the physician is necessary. It is the only means of ascertaining the truth. The woman who puts off or shuns such an examination because of a false sense of modesty is taking the most serious risk. Much has already been done to overcome these foolish prejudices, but they are still an important element in preventing the early recognition of this disease."

In addition to physical examination we should insist that a careful microscopic investigation be made in every instance where cervical or uterine cancer is even suspected.

Following Clark, our cases of uterine cancer are divided into three groups: (1) the very early or beginning cases; (2) the borderline cases, i. e., patients who have delayed seeking relief for three to six months after symptoms began; and (3) patients who have had pain, odor, hemorrhage and discharge for a year or more, these belonging to the late or practically hopeless class from a surgical standpoint.

For many years, and particularly since perfection of the Wertheim operation, the propaganda for early surgical intervention in cervical and uterine cancer has been most active, and this has also been true of cancer all along the line. If the results of this propaganda are to be measured by operability in patients who come to us with uterine carcinoma, we must admit it has not been altogether a brilliant success. Much remains to be done

in educating both the laity and the profession to heed the earlier manifestations of malignant disease. The former high mortality primarily with the small number of permanent cures has probably exerted a decided influence in deterring patients from seeking early operative relief. There has been noted some improvement in this respect during the last few years, but there is still much to be desired.

Our own surgical experience in the matter of permanent cures caused us, five years ago, to turn to radium in the treatment of uterine cancer. In the group of cases to be later presented none treated within the last year is listed. During our first four-year period with radium we have treated seventy-one patients with cancer of the cervix and three of the uterine body. Within the past twelve months we have treated an additional twenty-five cases of cancer of the cervix which are not included for obvious reasons in this report. As a result of our work we have arrived at some very definite conclusions concerning the value of radium as compared to radical operation in the treatment of cervical cancer. Our opinion is overwhelmingly favorable to the use of radium both in late and early cases; this in face of the fact that our work is entirely surgical and our viewpoint consequently biased and tinged by our surgical inclinations.

Prior to the use of radium the percentage of operability in patients applying to us with cervical cancer was quite low, viz., between 17 and 22 per cent. This practically agrees with the operability given by Clark of 20 per cent. Taussig shows 25 per cent operability. Jacobson, reviewing the work of eighteen surgeons, estimates a combined percentage of 46.2 per cent. Wilson, of England, gives the percentage as 32 per cent; Wertheim, in Vienna, 50 per cent; Bumm, of Kronig's Clinic in Freiburg, 78.9 per cent; and Graves, of Boston, from whom the foregoing figures are quoted, gives an operability of 64 per cent in one hundred and eighty-one cases.

For us the value of radium in the treatment of cancer is no longer conjectural or speculative. As a palliative remedy its usefulness is beyond the peradventure of doubt, and we are firmly convinced that as a curative agent in cervical cancer, if we are to consider the five-year period as an expression of cure, it has established a position not only equal to but even surpassing that to be obtained by operative means. We say this advisedly, recognizing full well some of the brilliant results at present secured by radical surgery in early operable cases.

In this discussion (as previously indicated) our cases are divided into three groups:

(1) Early or distinctly operable cases;

(2) Borderline (mostly inoperable) cases; and

(3) Late cases with local extension, often with metastatic and general involvement.

In every one of our cases the diagnosis has been verified microscopically and the pathological type of the neoplasm determined. But as our studies in the latter direction have not yet been completed, we are not prepared to discuss that phase of the topic as bearing upon the value of radium. Suffice it to say that, with other observers, we have noted basal cell growths slow to metastasize and yielding readily when seen early to both operation and radium. On the other hand, the prickle cell growths have proven very resistant to any kind of treatment.

EARLY CASES

These are the only ones in which today there may be some difference of opinion as to the best plan of treatment to be followed. Taussig's series showed no operative mortality, and Kelly operated twenty times consecutively without a death. Graves' series of one hundred and fourteen early cases shows a primary mortality of 5.2 per cent, ninety-nine of his patients being subjected to the Wertheim operation. When we study the five-year cures in these early cases we find in Graves' series 16.8 to 18.5 per cent of absolute cures and 27.6 to 34.2 per cent of relative cures. Bumm's statistics of January, 1919, quoted by Taussig, show 203 cases operated upon in 1911 to

1913 with five-year cures in seventy-seven, or 37 per cent. In 1913-14 he also treated seventy-seven cases with radium, seventeen, or 22 per cent, remaining cured for five years. Not having personally analyzed these cases, we can only assume they were all of the early operable type.

In a recent paper Mayer states that the most favored operation for carcinoma of the uterus is the Freund-Wertheim procedure; that this has been used for eighteen years in the gynecological clinic at Tubingen, during which period about one thousand cases have been treated. There were twenty cancers of the body of the uterus to eighty of the cervix. He further says that 65 per cent of the cases at the Tubingen Clinic and 42 per cent at the Bumm Clinic were operable. Mayer believes one-third of the cases are inoperable.

From a study of these figures one is seemingly forced to conclude that in the hands of highly skilled surgeons early operation presents the best chance of five-year cure and is attended by a fairly low mortality. However, I am inclined to believe that, generally speaking, the Wertheim operation is attended not only by a much higher primary mortality, but certainly by a much lower percentage of five-year cures. For my own part, prior to adopting the use of radium our five-year cures did not nearly approach such figures.

It is probably true, as Taylor says, that we may have formerly been led to operate when the chance of cure was slight and the operative risk great. Today many of these patients are treated with radium, which has also made a new group of cases in that it may render the inoperable case operable. Two such are included in our series. Incidentally we may say Taylor believes even operated cases should have the benefit of radium treatment; and in his experience nothing has produced such favorable results in operable cases as has radium.

Lynch states that early growths are best treated by wide excision, and that nothing treats so successfully as radium those cases in which extended surgical removal is not permitted. This is also the expressed opinion of Burnam, Graves, C. J. Miller and John G. Clark, though in the latter's mind there seems some doubt. He said in his discussion at the 1920 meeting of the American Association of Gynecologists: "With the use of radium the operative indications will steadily diminish." Personally, we not only agree with this latter opinion, but would say the time has come to treat all cases of cancer of the cervix, no matter how early observed, not by surgical operation but with radium. Hysterectomy has no longer a place in the treatment of cervical cancer; but if operation should be elected it must not only be done very early, but must be of the radical and most extended kind, just as we are doing for carcinoma of the breast. Contrary views are expressed by Schmitz, who says that in cases shown by physical examination to be clearly operable, radical abdominal hysterectomy is indicated; but if there are contraindications to operation radium treatment may be given.

Our series includes twelve cases of the early and distinctly operable type. Six of these patients were operated upon by the Wertheim method and radium was also used. Three of the patients are living and completely well after more than four years, one after three years, one after two years, and one after one year. The other six in this group were treated with radium alone. Three are alive and completely well after three to four years, and three after two to three years. In addition to these twelve patients, three others were observed who might have been successfully operated upon, but they were classed as borderline and subjected to radium. All are alive and well after more than two years.

The interpretation of the dividing line between the early or distinctly operable cases and the borderline type will necessarily vary with the individual observer. We have classified as early those in which the uterus was freely movable, without vaginal (especially anterior vaginal) involvement, and with no fixation of the uterus; in fact, the disease still being local.

BORDERLINE CASES

In this class we believe beyond question radium is the treatment of choice. Radical operation in this type has resulted not only in a high primary mortality, but in very few permanent cures. It has oftentimes befallen our lot to begin operation in the belief that radical excision was feasible only to find the invasion so extensive that cure was absolutely impossible. Unquestionably in fairly extensive local involvement radium yields the best results. Just how many cases of this type are in our series we cannot say, for having definitely concluded that such patients had best be treated with radium they have all been grouped among the late cases. None of them was cauterized or curetted. We are convinced that curettage is not a procedure to be applied in malignancy for very obvious reasons. The vast majority of the patients as we see them belong in Group 3.

LATE CASES

Late cases with extensive local involvement or metastases more or less widespread are clearly inoperable. Heretofore this group has either been abandoned surgically or subjected to cautery and curette, often to the disadvantage of the patient, followed always by rapid return of foul discharge and bleeding, never in any event prolonging the patient's life or rendering her more comfortable. In cases of this type even the most ardent advocates of early radical excision concede radium first place in the treatment. Kelly and Burnam have thirty-five such, either late or extensive borderline cases, the patients being alive and well after five years. Although we have no patients living after such a period, there are five living and apparently well after more than two years. In Adler's series of fifty-two cases of inoperable cervical cancer treated with radium alone, thirteen, or 25 per cent, remained free from recurrence from five to seven years.

Our custom has been to examine all these patients most carefully per rectum for broad ligament and glandular involvement. The same method is pursued in both late and early cases, even in the absence of the least fixation. Examination per rectum yields much more information as to deep extension than does either simple vaginal or bimanual investigation. Our observation in late as well as in early cases has served to emphasize the importance of Burnam's statement that "the possibilities of treatment by radium extend from the very beginning of the disease to the last stages of cervical cancer." Yet neither the laity nor the profession should expect too much from radium treatment, especially in late cases. The impossible cannot be achieved, notwithstanding the almost miraculous results seen repeatedly by those engaged in this work. Did time permit, a number of apparently hopeless cases could be reported in detail where the patients to all appearances are well with complete local healing after more than one to four years.

We have observed, where healing had apparently occurred and the growth later returned, that it can rarely if ever be checked, no matter how treated. This agrees with the experience of Heyman, Taussig, and Janeway. Moreover, we have had individuals in whom the treatment seemed to stimulate the growth, causing rapid increase in its progress. Whether this is due to fault in technic, dosage, or type of neoplasm, we cannot say. In practically all of our cases, however, there has been immediate local improvement with amelioration of all symptoms, subsidence of bleeding, foul discharge and pain. In none has pain been increased, as some observers have noted. Usually local healing has occurred even in those later dying, the exitus being due to internal metastases rather than the local process. Septic absorption from local ulceration has ceased and the cachectic appearance resulting therefrom has often been banished. Many of these unfortunates have had their lives prolonged and have no longer required the administration of morphin.

We have refused treatment to only eight, ten or possibly twelve patients, the local process in all being so extensive that improvement even could hardly be anticipated. We believe in justice to those who seek radium treatment that it is better to

reject these very late and hopeless cases. Otherwise, the failure of improvement in the few may act as a deterrant to the many who, though beyond operative relief, might yet be vastly benefited or even cured with radium. We must be honest and in no instance promise too much to these unfortunate individuals, even though the disease may seem in a most favorable stage. We have never promised nor do we ever speak of a cure, yet we are convinced that the statement of Clark that the results from radium treatment approach closely the operative results is too modest an expression, and that when the accumulated records have been studied the final results will be found to surpass those following operation.

Our technic in radium treatment has been essentially that described by Clark, and we have secured favorable results with the smaller dosage such as he uses. We have never employed the so-called massive dosage method advocated by other observers. In every case we have been careful to keep the rectum and urinary bladder as far as possible from the radium by gauze packs. Regardless of this precaution, however, we have had a few patients who developed proctitis or cystitis following prolonged treatment.

Our plan has been to give two or three exposures of twenty-four hours each during the period of a week or ten days, followed by a second series of exposure six or seven weeks later. Should this plan fail to produce marked improvement, further radium treatment has been discouraged. Our impression is that if the expected benefit is not obtained by two series of exposures as outlined, the case is hopeless from every standpoint. We are also reinforcing our radium by means of cross-firing with x-ray in the hands of a most competent radiologist.

CONCLUSIONS

(1) Cancer of the uterine body treated by total ablation of tubes, ovaries and uterus yields curative results which we cannot hope to surpass by any other form of treatment.

(2) In early carcinoma cervicis, although radical operation continues a justifiable procedure in the hands of the best operators, equally good, if not better, results, considering the primary mortality, are obtained by radium treatment.

(3) All borderline cases should be treated with radium.

(4) Late cases may be improved and palliated by radium as by no other means at our command.

(5) If the five-year period of curability is to be accepted as indicating a cure, then the results of radium treatment surpass by far those obtained by the profession at large in the treatment of cancer of the cervix by surgical means.

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Discussion follows paper of Dr. Lain, page 498.

THE PRESENT STATUS OF RADIUM THERAPY*

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Since the discovery of radium in 1898 by Madame Curie, assisted by her husband, Prof. Curie, the entire world has been attentively listening and ready to accept as truth without question any announcement as regards either its benefits or evils.

*Read in Section on Surgery, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

This attitude of the public mind has been largely due to two events: first, to the discovery, just three years previously, of the x-ray and later its revelations both in the human organism and in the chemical laboratory; second, to the discovery of the similar though stronger potentiality of radium. Radium was soon suggested and tried in the treatment of malignant growths and, as after the discovery of the arsphenamin treatment for syphilis, it was prematurely heralded through the lay press that a long-sought and certain cure for cancer had at last been discovered.

On account of the scarcity of radium-bearing ores and the extremely slow and expensive process of radium extraction, not enough of the element has been available, until the past few years, for a sufficiently extensive clinical experimentation to be of statistical value. At the present day, when we review or hear reports upon radium therapy, it is important to know the quantity of radium used and the kind and degree of filtration, as well as the unbiased qualifications of the operator. This brief resume and estimate of the present status of radium is based upon over five years' special practice in the combined use of radium and x-ray, following a previous fourteen years of experience with the x-ray.

By means of a combined x-ray and radium therapy we have treated various types and kinds of malignant disease: during the past five years, 1157 cases. We appreciate that this experience and number of cases do not bear sufficient weight to carry complete conviction of conclusions which may be expressed herein. But we have also made use of opportunities to visit the larger radium clinics of America, both private and public, and have reviewed most of the valuable literature upon radium therapy published during the past five or six years. We are convinced that radium has now established for itself an important place in the treatment of both benign and malignant neoplasms, and it remains for the conservative and qualified users to estimate properly its value.

Let us briefly survey this field, beginning with the effects of radium upon both the normal and the pathological cell.

Pfeiffer and Freidberger[1], also Green, did experimental work with the beta rays of radium projected into culture tubes, using controls of various organisms such as B. prodigiosus, Staphylococcus pyogenes aureus, anthrax and B. typhosus. These organisms, after several days' exposure to beta rays of radium, did not grow, though they remained in the same culture media. By further control experiments they have proved that the inhibitory effects upon the bacteria were not due to the action of the beta rays upon the culture media. Though these experiments have since been verified by others, the bactericidal effects of radium rays have not yet proved to be of sufficient value to be utilized for the treatment of such infections.

The often repeated law of Bergonia and Tribandeau, namely:

> "Immature cells and cells in an active state of division are more sensitive to the x-ray than are cells which have already acquired their fixed adult, morphological or physiological characters,"

has been repeatedly verified by many American pathologists. This law has been demonstrated to be equally true with the application of radium. It has also been proved, both experimentally and clinically, that insufficient or fractional doses of radium tend to render animal tissues hyperemic and only stimulate growth rather than cause a process of cellular degeneration. This phenomenon was perhaps largely responsible for the difference of views among some of the earlier experimenters with radium.

It was early discovered that radium emitted three classes of rays of different degree of penetration and chemical activity which produced different effects upon cellular life. Thus is explained the need of various metal and rubber filters to eliminate the effects of one or more groups of these rays and to give the highest degree of radiation upon the particular depth or tissue we desire to affect. The development of this knowledge, together with the manufacture of radium needles and examination tubes, which may be inserted directly into the tumor mass, has materially improved the percentage

of cures in cancer of the deeper and more remote structures of the body.

Radium has been tried for the treatment of almost all the ills to which the human body is heir, although its most conspicuous successes have been attained in that class of diseases manifested by hyperplasia of soft tissue or lawless cellular proliferation. The hyperemic and stimulating effects of short and superficial applications of radium have been used for relief or cure of many chronic skin and other diseases, but on account of its high price and the limitation of areas covered, other therapeutic agents are usually to be preferred.

Like the x-ray, radium therapy has been passing through the shadows of illiterate misconceptions and unfortunately has been handled at times by the unscrupulous. It has also been a good revenue partner to the unscrupulous or over-zealous physician.

Today finds radium taking its position as an agent of first choice in the treatment of such diseases as vascular nevi (birthmarks), leucoplakia, keloids, pre-epitheliomas and epitheliomas of any cellular morphology which is yet in a pre-metastatic stage and situated upon exposed parts. It is also to be preferred in other locations where surgery would cause unnecessary scarring or loss of tissue. Radium has taken an undisputed place in the treatment of inoperable cancer wherever located. Here it has very much added to the comfort and longevity of the patient and in rare instances has perhaps entirely cured. Within this indisputable field belong also all cases of post-operative cancer where positive assurance cannot be given the patient that all malignancy has been removed, provided that in certain post-operative cases x-ray may by reason of its wider radiation be the preferable.

If I should attempt to classify our present knowledge of radium therapy, it would be as follows:

(1) It is a satisfactory treatment in most pathologies and new growths of a benign nature, such as, vascular nevi (birthmarks), papillomas (moles), verruca (warts), keloids, uterine fibromas and in other non-malignant uterine hemorrhages.

(2) In all cases of inoperable and post-operative cancer and in such diseases as Hodgkins' disease, lymphatic leukemias or lympho-sarcomas, radium has been used to give comfort, prolong life, and give hope for an occasional cure.

(3) All pre-cancerous lesions such as senile keratomas, leucoplakias and non-suppurative tubercular adenitis, all epitheliomas of the skin or mucous membrane of any morphology which are yet in a pre-metastatic stage, particularly those which are situated near the eyes or upon the lips, also cancer which is limited to the cervex uteri are successfully treated by radium and it should be the method of first choice in the majority of cases.

(4) Into a fourth and last group, might be placed the toxic goiters, chronic and hypertrophied tonsils, cancer of the bladder or prostate and cancer of the rectum. Over this group there has been endless discussion during the past few years.

Since the results of the use of radium have been so extensively proven by intelligent and cautious radiotherapists and so widely accepted as a method of choice for our first group of diseases, we shall not attempt to discuss them. We shall add that our own experience has repeatedly verified that of others, in the treatment of an old non-specific chronic endometritis or a non-malignant uterine hemorrhage. In such cases no treatment is quite so satisfactory and often successful as an intra-uterine well filtered radium treatment of from 500 to 1000 mg. hours. One or two such treatments usually suffice completely to control hemorrhage after two or three weeks, followed by amelioration of all uncomfortable symptoms.

For the treatment of our second group of inoperable and post-operative malignancies, radium has long been recommended. Numerous reports are now accumulating of occasional cures of advanced cases of rectal or uterine cancer which had previously been classified as inoperable.

Upon the third group, surgeons and radiotherapists alike agree, except as to malignant growths at certain locations such as the lips, buccal cavity or upon covered parts of the body where scar or con-

traction following an operation is not of consequence.

Tabulated statistics, as given by several of our larger surgical clinics, upon the treatment of cancer around the orbital regions or upon the lips, as compared with a like number treated by radium, fully justify a preference for the radium in most of such cases. The clinical and statistical evidence is rapidly accumulating, which strongly justifies a prophecy that in future years all cancers of the buccal cavity including lips and tongue will be treated entirely with radium. With a more abundant supply and with improved applicators and technic, case reports of high percentages of apparent and permanent cures with radium should cause us seriously to consider whether or not the life of the female might be far better conserved in cancer of the cervix by the use of radium than by surgery.

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DISCUSSION

Papers of Drs. Frank and Lain.

Dr. William Neill, Jr., Baltimore, Md.—The newly elected President of the American College of Surgeons recently made the statement that there was never a case of cancer cured by radium. I am sure you can draw your own conclusions from the two papers just heard and the excellent photographs just seen. At the Howard A. Kelly Hospital we feel that the best results in the treatment of carcinoma of the uterus are obtained by a combination of both radium and surgery. The cases are divided into several groups: first, the early operable cases. It is surprising how few of these we see. They are the exception. In this group the growth is limited entirely to the cervix, with no vaginal involvement, and no thickening in the parametrium. This must be determined by rectal examination, as it can not be felt by vaginal examination alone. Second are borderline cases, where there is extension on the vaginal mucosa; third, local inoperable cases, where there is huge cervical growth and fixation of the parametria; fourth, cases with complete fixation, general metastasis and cachexia.

In group one, cure can be hoped for in a considerable number of cases, first by radical surgery, second by radium, and third by a combination of these two methods. In group two, a small percentage of cures can be hoped for by surgery, a larger percentage of cures by radium and a much larger percentage by a combination of these two methods. In group three surgery is harmful. Radium is a splendid palliative. A local cauterization or curettage should not be attempted. Whether it tears down the normal protective barriers of the patient against cancer I do not know, but it certainly lessens her chances of being helped. In group four, a cure can not be obtained, but radium will often make the patient comfortable for a considerable time.

Prior to operation the best results will be obtained by radiation given contracervically, a total dosage of at least 1,000 to 1,500 milligram hours. After operation prophylactic radiation is of assistance and this should be given trans-sacrally and trans-abdominally, running the dosage up to from fifty or seventy-five to one hundred gram-hours. One must have at hand a large amount of radium to give this treatment with any prospect of success.

Carcinoma of the cervix is one of the most frequent types of cancer met with, and it is appalling how many inoperable cases we see. The general idea is that it is a disease of married life and middle age, but we should watch any case that presents unusual symptoms, for we often see cases between the ages of twenty and thirty in unmarried women. The youngest case reported is that of a girl of fourteen years with a large growth of the vagina. Two years ago Dr. Curtis F. Burnam went over our entire material of cervical cancer, including over 1,000 cases, and some conception of the possibilities of radium treatment as a permanently curative measure was afforded. Radiation alone in operable carcinoma of the cervix cures 50 per cent. Radiation primary to operation for operable carcinoma of the cervix cures 46 per cent. Radiation, prophylactic after operation upon operable carcinoma of the cervix, cures 43 per cent. Radiation alone in borderline cases cures 31 per cent. Radiation in inoperable carcinoma of the cervix cures 9 per cent. The first case treated in 1912 was one of this type. We did not know as much about radium and had only 100 milligrams, but the patient lived and is well today. Radiation in recurrent inoperable cancers of the cervix cures 11 per cent.

After a greater experience and after we have developed our technic further, which we are endeavoring to do each year, we can look forward to the best results in this type of malignancy. It is a question of getting the cases early. I am afraid we shall not cure a case where the disease has advanced out of the pelvic wall.

We have had no fatalities from radiation, even with tremendous doses. As long as the leucocyte count stays over 5,000 one can go ahead with heavy dosage, but when it drops below that point the danger line is reached and treatment should be discontinued for several months.

I understood Dr. Lain to remark that in Hodgkins disease, lymphosarcoma and leukemia, radium was a good palliative, but that no cures were to be expected. Our first case of Hodgkins disease was treated in 1915. The patient is still alive and quite active. The first case of leukemia was treated in 1916. The patient is still alive, but with splenic enlargement. A case of lymphosarcoma treated in 1913 is still alive. To get these results one needs a large amount of radium. From a gram and a half to 3 grams of radium were used in the treatment of each of the above cases.

Dr. Clyde O. Donaldson, Kansas City, Mo.—The uterus makes an ideal filter for radium. The re-

sults are far superior when it can be used to the results obtained by taking the uterus out and then using radium or x-ray, but especially radium. With the radium you can obtain more time without harm to the parametrial tissues. There is no use in going over the use of radium as compared with surgery. But life can be prolonged, hemorrhage can be stopped and the profuse, foul discharge can be decreased or stopped entirely by radiation. There is no treatment of a serious disease so satisfactory from the patient's standpoint as that of the treatment of carcinoma of the uterus with radium and x-ray.

Dr. W. S. Anderson, Memphis, Tenn.—Malignancies of the fundus, as Dr. Frank brought out, are entirely surgical.

It has been decided in the minds of all who are working with both surgery and radium that the inoperable or advanced cases are strictly for radium alone. In these cases miraculous results have been procured and remained over a period of five years, something that surgery has never been able to accomplish.

In the early cases Dr. Frank and Dr. Neill both report that with the use of radium alone 50 per cent have been carried beyond the five-year time. Such results, unless in the hands of the most successful operators, never have been accomplished by surgery.

As to pre-radiation, I heartily agree to that, but if radiation has been done, then operation should be done promptly, within ten days. In cases where we have done a pan-hysterectomy and there is recurrence, surgery is hopeless.

Nothing has been said in regard to the x-ray in combination with these cases where radium has been used, especially in the borderline cases. Where we get satisfactory local results and everything seemingly is in good shape, the x-ray should be used in cross-fire method in combination with the radium. For this reason, if some of the cancer cells have invaded the parametrium, we may reach them with x-ray where radium has not reached them.

Dr. Frank K. Boland, Atlanta, Ga.—I noticed that Dr. Frank in his statistics reported as dead several people who are still alive. That reminded me of the story of the man who was very sick and the doctors were about to hold a consultation. He was anxious to get all the information he could so he had his little boy hide under the sofa in the room where the consultation was to be held. After it was over the little boy came back into his father's room and his father asked him what the doctors had said. The boy said he could not understand all the big words and all he knew was that one of the doctors said they would find out the trouble at the autopsy.

One of the tables Dr. Frank showed us gave cancer as having increased 2½ per cent in the last few years. I think the figures can be explained by the fact that we are reporting more cases. The profession as a whole is better able to diagnose cancer than in former years, and this increase is more apparent than real.

Dr. Irvin Abell, Louisville, Ky.—We should impress upon the general practitioner the necessity of taking care of tears of the cervix, particularly those which later on show indurative or ulcerative changes. In the past two and a half years we have had several cases of carcinoma of the uterus which, because of cardiovascular or renal disease, were not good cases for hysterectomy. They have been treated with radium, and while there has not been sufficient time to form conclusions as to the ultimate outcome, so far they are symptomatically well.

Recently we have been using radium in deeper lesions and have been burying it in cases where the lesions were too deeply situated for surface application. While it is too early to have any definite ideas as to the ultimate outcome, I believe it is an excellent adjuvant to other methods of treatment.

We have noted two cases of paralysis following the use of radium. In one case in which a sarcoma had been removed surgically the patient lost control of the sphincter three weeks after radiation and this condition persisted until her death from metastases. In a second case of carcinoma of the skin and underlying tissues of the preauricular region we buried in the tissues a capsule containing 50 mg. of radium and also some needles. Most of the extension was above the duct of Stenson and three weeks following the man developed a facial paralysis, which has persisted for eight or nine months. In one case of carcinoma of the ampulla of Vater we had done a cholecystoduodenostomy. A section of the growth had been removed and histological examination proved it to be adenocarcinoma. After waiting a sufficient length of time for him to regain his strength we opened the abdomen and anchored a capsule over the ampulla with No. 1 catgut sutures and then passed a stomach tube through the mouth and out through the intestinal wound; the linen thread which was tied to the radium capsule was then brought with the tube through the mouth. The wound was closed and after a sufficient length of time the radium was withdrawn easily through the mouth.

This method might offer some means of using radium for carcinoma within the abdomen in other cases where it had before proved impossible.

Dr. J. Shelton Horsley, Richmond, Va.—I dislike to take the joy out of the radium party, but what we wish to know are the actual effects and the facts. There are other facts that have not been stated. It is true that radium in carcinoma of the cervix is a very efficient remedy. I have a much more limited experience than the speaker has had, but as the result of Dr. Frank's excellent statistics and of my own experience I never expect to do a hysterectomy for carcinoma of the cervix. In carcinoma of the oral mucous membrane radium undoubtedly has a place, but I should like to have Dr. Lain tell us about some of the cases that it *has not cured*. I have access to a small amount of radium which we use in certain cases. When large amounts have to be used I usually send patients to Baltimore. I have seen several cases treated by large doses of radium in the hands of the world's most skillful radiologists, and the results are not always successful. In some instances the patients have been made worse. I recall one case in which radium was applied in a small amount in New York for carcinoma on the bridge of the nose. This was apparently cured. The man had a metastasis just beneath the ball of the orbit. I did a very extensive

operation and then sent him for large doses of radium, and he received no benefit whatever.

Let us be perfectly frank about it. If there is an open lesion radium treatment should often be used. There is a great field for it, but it is unfortunate to let the thought go out that radium is a panacea for growths about the face and neck which can be very quickly and thoroughly removed by surgery and the electric cautery, and where the number of cures after properly performed operations is very gratifying.

Dr. A. J. Crowell, Charlotte, N. C.—The proper selection of cases for the use of radium is very important. If we treat the initial lesion only and there are extensive metastases we can not expect the patient to be cured by radium.

Dr. Braasch told me a short time ago that 35 per cent of his cases of carcinoma of the prostate gland in which the capsule had been penetrated by the growth showed metastases to the pelvic bones. In such cases, of course, we could not expect radium to perfect a cure. He also stated that in a series of about 640 cases studied at the Mayo Clinic, some treated with and some without radium, they found life had been prolonged about six months by the use of radium and x-ray, and that they were now rather discouraging patients from taking radium and x-ray treatments in such cases, especially with bone metastases. In cases where we do not have metastases there is ample evidence that it is of real value. But we should not expect too much of x-ray and radium.

Dr. Edmund Denegre Martin, New Orleans, La. I wish the essayists would give us the doses used in the cases they report. Our results are not encouraging and I should like to know whether we use enough. If not, then we are not doing justice to our patients.

In regard to the increase of cancer, I believe this is due to the fact that we are reporting more cases than we did formerly. In 1893 — about the time antitoxin was introduced — our death rate in diphtheria in New Orleans was 35 per cent. It was required that all cases be reported. If not, a fine was imposed upon the physician, but the treatment and the methods adopted by the Board of Health were so disagreeable that no doctor ever reported a case until he was pretty sure that the patient was going to die. We established a laboratory in the Board of Health and reduced the mortality in this disease from 35 to 8 per cent, due to the fact that all mild cases as well as the severe types were reported, even before antitoxin had been used.

Dr. Frank (closing).—We are using 100 milligrams of radium and I believe for our work that is sufficient. We are not radiotherapists. Our work is surgical, but we felt that in cancer of the uterus our results by the radical operation were so bad, in comparison with the results obtained at Johns Hopkins and other places with radium, that we should obtain radium. We have arrived at the conclusion and are at present of the fixed opinion that we shall operate no more cases of carcinoma of the cervix, whether seen early or late, irrespective of time. We feel that if with radium we can achieve the results that have been secured in borderline and late cases there is no reason for subjecting any patient with cervical cancer to a 15 per cent primary mortality from operation. When we speak of radical operation, the Wertheim operation, we are dealing with a tremendous operation with a tremendously high mortality. This must be taken into consideration. We have treated some 400 cases of cancer in various parts of the body. We do not believe that cancer of the lungs or of the viscera, as the stomach or intestinal tract, can be treated with radium to much advantage, because if it is used in dosage to get desired results it will cause a perforation of the viscus and death of the patient. In carcinoma of the body of the uterus the primary operative mortality is so low and the results so good by surgical treatment that there is no advantage in the use of radium. There is no advantage in locating the carcinomatous area in fundal cancer. If it is small and the radium can be brought into direct contact you will probably get a cure. If the disease is extensive and has existed for any length of time the infiltration of the uterine wall is so great that the same disasters may occur from sufficient radium dosage as in the other hollow viscera treated with radium, as has been mentioned. As stated in the paper, it is our custom in all "radium cases" to have all curetted or removed material subjected to the microscope.

I may say for the benefit of the Doctor that the patients reported in the statistics as dead are not in a position to object to the report.

Dr. Lain (closing).—I wish to thank Dr. Neill for reporting the cases of leukemia and Hodgkins disease which had been cured. I stated in my paper that perhaps occasionally cures had been effected. I believe that the treatment of leukemia and Hodgkins disease by radiotherapy offers a hopeful field, although our own experience has been too limited to attempt any prophecy.

Dr. Hoffman, of the Prudential Life Insurance Company, in a recent report, shows that deaths from cancer in 1919-20 had reached the horizontal line, thanks to the Society for the Control of Cancer, the College of Surgeons and other organizations.

As to the cause of paralysis of the sphincter after radium treatment of cancer of rectum, I do not know what may have been the cause in the case mentioned, but I recall having seen many similar cases which were not treated with radium or x-ray. This probably resulted from metastasis in the cord.

Dr. Horsley asked that we tell about our failures as well as the cures. It was not within the scope of my paper to discuss fully statistics upon treatment, although in the treatment of malignant growths within the mouth or upon the mucous membranes of the buccal cavity, including the lower lips, I believe our records show a higher percentage of cures by radium than by surgery alone. I affirm that radium is the preferable treatment. We are now attempting as radiotherapists to prevent the impression going out to the public or physicians that radium will cure the far advanced or hopeless case.

I have endeavored in my paper to make clear that the pre-metastatic stage of cancer is the ideal stage in which to expect success, and that radium has proven the preferable agent for the treatment of malignant lesions within the buccal cavity or upon any part of the face.

EYE, EAR, NOSE AND THROAT

THE MANAGEMENT OF TUBERCULOUS LARYNGITIS*

By William V. Mullin, M.D.,
Colorado Springs, Colo.

Certain statements concerning tuberculous laryngitis which from my experience I believe to be erroneous are so often made, and are so harmful in their tendencies, that I am glad of this opportunity of going on record as opposing them.

In the first place, the laryngologist is prone to consider tuberculous laryngitis from the angle of the image which he sees in his throat mirror, without sufficient knowledge of the state or progress of the lung disease. The invasion of the larynx must be considered both from the standpoint of diagnosis and treatment as a complication of pulmonary tuberculosis. It must be recognized as secondary in development and importance to the original lung lesion. The diagnosis must, therefore, depend not alone upon the laryngeal inspection but must be corroborated by lung findings made by a competent diagnostician with appropriate laboratory investigation. The closest cooperation should exist between the internist and the laryngologist if mistakes in differential diagnosis are to be avoided and the best interests of the patients conserved. Syphilis and tuberculosis can not safely be differentiated by the laryngologist alone. I wish to emphasize the fact that it is a mistake for the clinician to conclude that this complication does not require the supervision of the specialist, and it is equally a mistake for the laryngologist to arrive at a diagnosis and proceed with treatment with an insufficient knowledge of the pulmonary condition.

The average sanatorium physician is well versed in tuberculosis, but his knowledge of ear, nose and throat work is not likely to be that of a specialist. He can hardly be expected to be entirely familiar with non-tuberculous lesions of the larynx or with many of the pathological conditions in the upper respiratory tract that have a direct bearing upon the general condition of the tuberculous patient. I do not wish to convey the idea that I would discourage the sanatorium physician from making laryngeal examinations and carrying on treatments, but I do urge him to avail himself of the services of a laryngologist as a consultant. The reverse is likewise true. The laryngologist, working independently, is in no position to judge how far he can go safely in treatment, operative or otherwise, without harming the patient. Many cases of pulmonary tuberculosis have undoubtedly suffered permanent harm from the injudicious or improperly timed removal of tonsils or appendix. A fixed program of treatment which ignores the general condition of the patient and the activity of tuberculous lesions elsewhere frequently leads to disaster.

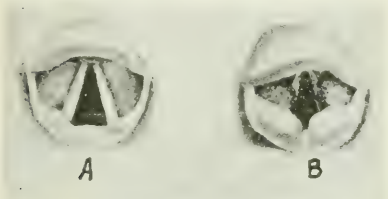
The second misleading attitude toward laryngeal tuberculosis is found in the common statement that silence is the only treatment required or useful in this condition. I want to emphasize my belief that all cases of tuberculous laryngitis should be treated, even though the treatment be only palliative or psychological, but to put an individual to bed, give him a pad and pencil and instruct him to maintain absolute silence and then do nothing else for him is too depressing. He should be examined at definite intervals, encouraged if progressing favorably and treated as indicated if the reverse is found to be true.

I believe in silence rigidly enforced where the laryngeal condition is active. Whispering is a pernicious habit and should have no place in the treatment of these cases. It has practically all of the disadvantages of any use of the voice and is hard to control.

It must be admitted that the Spartan individual who will consistently adhere over long periods to the sign language or writing pad is probably the exception, and that more or less whispering will be

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

indulged in by the average case. If the laryngologist will insist that the patient must not whisper under any circumstances, much better control of the situation will be obtained. When an emergency exists which cannot be met in any other way than by speaking, let the patient use the full voice and not a whisper. It will be found that, under these circumstances, such "emergencies" will be much



Slide No. 1.—A, acute tuberculosis of the larynx; B, condition of the larynx six weeks later. (Dr. Julius Dworetzky, Liberty, New York. Transactions of Laryngology, A. M. A., 1917.)

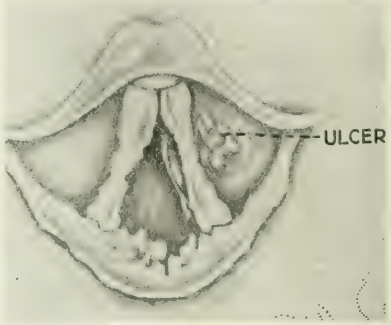
less frequent than when whispering is permitted. If not instructed on this point, patients will soon conclude that whispering means rest of the voice. Speaking with the full voice has the merit of restoring tone to the laryngeal muscles and preventing limitation of the crico-arytenoid joint by infiltrations which hamper its movements.

Slide No. 4.

As opposed to the advocates of silence as the only necessary measure, and for direct comparison of the different attitudes toward treatment, let me quote from the work of Rudei, of Davos:

"During a period of six years I have treated at Davos 575 cases of laryngeal tuberculosis; and in these 575 cases, 1,548 operations were performed. In 61 cases curetting was performed; in 168 both curetting and cauterization was done; and in the remaining 1,319 the electrocautery alone was employed.

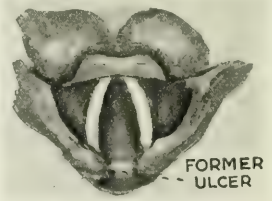
"The patients were submitted to operation for their laryngeal lesions only after their general condition had been improved by fairly long fresh air treatment. In the case of a certain number of them, conservative treatment by means of painting with caustics or anesthetics or by heliotherapy was employed beforehand. It was only after the non-success of these measures that resort was had to operation. This



Slide No. 6.

plan presented the advantage that the operative therapy was utilized only under good conditions and on tuberculous patients whose processes had become, so to speak, stationary."

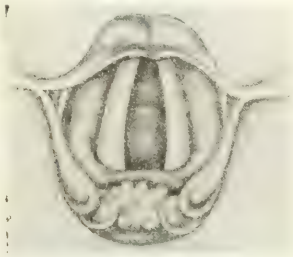
Unfortunately, there is no specific treatment for tuberculosis, and the laryngeal lesions are no exception to this rule. Each case should be studied individually. Experience, however, has given us fairly



Slide No. 7.

definite indications as to the line of treatment which may be expected favorably to influence laryngeal tuberculosis. A fair number of cases tend to recover without any treatment, showing that the laryngeal disease may participate in the effects of

acquired resistance so well recognized by its influence on the pulmonary lesions. In the majority of cases, however, this tendency to an arrest is either absent or insufficient to bring about an unaided recovery. As we have no method of estimating in advance what the natural resistance may accomplish in any given case, the failure to make use of any meas-



Slide No. 8

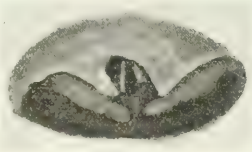
ure known to be of service amounts to neglect.

Rest of the larynx by a period of silence is a valuable measure in this condition, as is rest in pulmonary tuberculosis, but must be supplemented in many cases by more active measures. The larynx, unlike the lungs, is accessible to direct operative procedures.

Slide No. 9

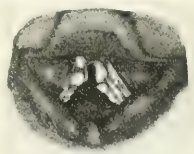
To summarize treatment, this should begin with careful attention to the nose and throat, as a great many of these patients are in bed on account of elevation of temperature and do not take care of their secretions well. The effects of a deviated septum or of infection of the sinuses or tonsils have a definite influence upon the general physical welfare, but the question of the appropriate time to operate for the relief of these conditions must be given the most careful consideration in pulmonary tuberculosis. Diseased tonsils may be largely responsible for a persistent temperature, but such a conclusion can only be arrived at after the internist has satisfied himself that the chest condition is not solely responsible.

Cough will irritate the larynx and an irritated larynx or pharynx will perpet-



Slide No. 11

uate and aggravate the cough. Intratracheal injections of a soothing oil, I have found of great service in breaking up this vicious circle. The laryngeal syringe in preference to the swab is most satisfactory, as it avoids trauma and gagging and permits covering the whole laryngeal surface as well as the trachea. On the other hand, you may be able to make no progress with an actively dis-



Slide No. 12

eased larynx until the cough and profuse secretions improve, as may happen after an artificial pneumothorax.

A slight verrucose thickening in the posterior laryngeal wall often gives the scratchy feeling of a foreign body. This annoyance will usually disappear after several light applications of the galvanocautery. Trichloracetic acid will produce the same result, but is often followed by a temporary spasm.

Infiltrations will usually respond to rest and mild palliatives, such as weak iodin solutions and argyrol, but edematous swellings will probably require deep cautery puncture. Localized ulcerations respond best to cauterization of sufficient extent to produce a slight slough, best done by a larger cautery point.

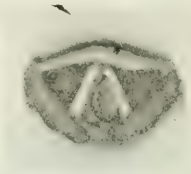
Slide No. 13.

Undoubtedly, the galvano-cautery offers better results than curetting or any other form of operation. It may be used vigorously so far as the larynx is concerned, but the shock and effect upon the general condition prohibit its use in many instances. Persistent elevation of temperature and rapid pulse usually contraindicate radical procedure, but here again the case requires

Slide No. 14.

individual study by the internist and the laryngologist. In exceptional cases the unfavorable progress is dominated by the laryngeal condition and will not improve unless this can be relieved. Dean emphasizes this point of cooperation in his paper, stating that cauterization should only be carried out with the permission of the pulmonary expert. He has frequently advised cauterization and set the date for the operation only to defer it on the advice of the chest man.

Where ulcerations are numerous and extensive and the pain very great, I find that



Slide No. 15.

Freudenthal's orthoform emulsion will give the most relief. Heliotherapy in some cases also seems to have an almost specific effect. Tuberculomata are usually found

Cyst of epiglottis.

in chronic cases and, unless they prevent phonation or produce cough, I prefer not to remove them, as these lesions rarely break down. If the patient's general con-

dition is very good, there is no great objection to removing them. This is best done under suspension laryngoscopy. Injection or resection of the superior laryngeal nerve relieves the pain in some cases, especially when otalgia is present, but will, of course, fail in painful deglutition where the area involved extends beyond the region supplied by this nerve.

Formalin and lactic acid have their advocates, but they have proved of little service in my hands. Unless palliatives only are indicated, agencies such as sunlight and the galvano-cautery, which provoke deep tissue reactions, will give the most positive results.

Tracheotomy must be done in some cases and when it becomes apparent that this is inevitable, we should give the patient the benefit of this procedure early. Delay results not only in unnecessary suffering, but, by prolonging the bad effect of the stenosis, may prevent or greatly retard any subsequent improvement. When it is apparent that the prognosis is hopeless, nothing more than that which would add to the patient's comfort should be done. Under this heading might well come removal of the epiglottis. Prognosis will be governed by the course of pulmonary disease.

It is useless to compare results in treatment unless the cases under consideration are classified according to the stage of the disease and the condition of the patient. Some such classification as that adopted by the American Sanatorium Association should be used.

Most of these slides are reproduced from drawings of my own cases, but a few are taken from a series used for teaching laryngology before the Colorado School for Tuberculosis. Where slides other than my own are used, I shall give credit.

Slide No. 1 is from a case of Dworetcky's, of Liberty, N. Y. The first cut shows the condition of the larynx on Dworetcky's first examination, and the second cut, the same case six weeks later, which brings out the point that some cases will go quickly to an unfavorable termination regardless of care and treatment.

I find great difficulty in obtaining an artist who can get the proper idea of the larynx and sketch pathological conditions. Some laryngologists are fortunate enough to be able to do this themselves when they make the examination. Dr. Casselberry, of Chicago, was one of these fortunate individuals. The next two cuts are made from his drawings because I felt that they were very accurate.

Slide No. 2 shows the thickening of the mucous membrane often found in chronic laryngitis, which is due most probably to the irritation from secretion dropping from above. This thickening of the mucous membrane must be differentiated from a beginning tuberculosis. The infiltration of tuberculosis always affects the deeper tissues first and then comes to the surface.

Slide No. 3, also of Casselberry's, shows infiltrations of tuberculosis and particularly well an early diagnostic sign known as Casselberry's fissure. In the larynx unaffected by deep infiltrations, the mucous membrane over the crico-arytenoid joint and in the vocal angle will fold in on movement of the cords without producing disturbance, but when infiltrations are present the mucous membrane will not fold in, and due to the tenseness underneath will crack open and produce the fissure.

Slide No. 4 shows a rather typical case in which there is not much difficulty in making a diagnosis of tuberculosis by inspection. As infiltrations increase, they will eventually bring pressure upon the blood vessels which lie next to the firm cartilage underneath. This prevents a venous return and causes a stimulation of the mucous glands with edema as a result. This edema is rather characteristic, as it is submucosal in character. This slide also shows the indications for deep cautery puncture.

Slide No. 5 is that of a case of mixed infection of syphilis and tuberculosis. It is not possible to say which is which from inspection. Case later required tracheotomy. Slide No. 5-A is an x-ray of the chest and shows a case of active pulmonary tuberculosis. You can see that the involvement is rather extensive on one side. The patient ran temperature and raised tubercle bacilli. During his stay at the Sanatorium, an ulceration developed on the left side of his pharynx. This proved to be syphilitic and not tuberculous, and the problem of treating him for his syphilis without making his tuberculosis worse was a very great one.

Slide No. 6 is that of a woman, age 38, with complete aphonia. Coughs and raises a great deal, but has never had any pain. She has no elevation of temperature. Here is a case with an indication for the cautery to the ulcer in the left laryngeal wall, and laryngeal exercise to endeavor to bring the cords together as much as possible.

Slide No. 7 is a healed localized ulcer in the posterior wall, which healed under the use of the galvano-cautery. The function of the cords has been somewhat disturbed and the voice is still hoarse and will probably remain so. In this case the laryngeal symptoms certainly predominated and were so painful that no progress could be obtained until this painful ulceration responded to treatment.

Slide No. 8 shows a tuberculoma in the posterior wall in a woman who still has some activity in her chest. This is the type of case in which

I do not advise removal of the tuberculoma. The woman has a very marked deviation of the septum to the right, which gives her a great deal of annoyance and whenever she is in proper condition to stand any operative work this should be given preference, because I feel that it has far more bearing on her general condition than has her larynx.

Slide No. 9 shows a case in a boy age 20 that healed without treatment. This was the condition of his larynx when I first examined him.

Slide No. 11 shows a healed tuberculous larynx, although it might not be recognized as such. There is a large piece ulcerated out of the epiglottis, and there is a fixation of the right cord in the midline with limited motion of the left cord and subglottic thickening. This case required a tracheotomy twelve years ago and the man still wears his tube. However, he is able to carry on rather an active and useful life.

The next four slides are shown to emphasize the point of thorough cooperative physical examination.

Slide No. 12 is of a case sent to a sanatorium for tuberculosis because of loss of weight and loss of voice. The case proved to be one of malignancy. St. Clair Thomson recently reports fifty cases carefully examined, both indirectly with the mirror and by direct examination after splitting the larynx, and cancer was not found originating in the posterior commissure or inter-arytenoid region of any of the fifty cases.

Slide No. 13 is that of a man sent to Woodmen Sanatorium because he was hoarse. No tuberculosis was found in his chest or larynx.

Slide No. 14 is from a man with considerable pulmonary tuberculosis. He was running an elevation of temperature and had a great deal of cough. I put off removing the tumor, which you see, because of his poor physical condition. This proved to be a mistake, as it was undoubtedly responsible for a great deal of his cough. After removal the man gained thirteen pounds and some time later died of an intercurrent disease.

Slide No. 14 shows the case on phonation, and Slide No. 15 on inspiration, showing the attachment of the tumor on the under surface of the left cord.

Slide No. 16 shows a tuberculous ulceration of the soft palate and left tonsil. This boy's father also had tuberculous laryngitis and the boy showed very low resistance.

Just as the internist must be constantly looking for conditions other than tuberculosis in his patient, so must the laryngologist be looking for non-tuberculous conditions of the upper respiratory tract. The next two slides show conditions picked up on routine examination of the larynx.

Slide No. 17 is a cyst of the epiglottis with a chronic tuberculous laryngitis. Some infiltrations of the epiglottis can be seen in this picture. The man has considerable pulmonary tuberculosis and a tuberculous right ear. However, he had no symptoms and this condition was found on routine examination.

Slide No. 18 is another cyst of the epiglottis which produced no symptoms and was found on routine examination. The man had very slight pulmonary involvement and the larynx was otherwise negative. In this case the tumor was shown to the artist and the location and outline was demonstrated on a wet specimen. The artist sketched the condition just as seen. It explains the roughened condition of the tongue, which is due to hardening from formalin.

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DISCUSSION

Dr. J. A. Stucky, Lexington, Ky.—In the State Tuberculosis Sanitarium, at Lexington, we have been getting very favorable results from having all the foci of infection in the mouth, throat and nose cared for as soon as patients enter. We have had a number of children with undoubted pulmonary tuberculosis in the first stage, who have had diseased tonsils, adenoids and teeth cared for, with rapid and marked improvement of the tuberculous condition.

But the cases that are puzzling are those of mixed infection. There may be tuberculosis of the larynx or pharynx and syphilis of the pharynx or larynx at the same time. I have seen two or three cases where there was a triple infection, as revealed by post-mortem later on, similar to the case thrown upon the screen a few moments ago, where there was a 4-plus Wassermann and undoubted tuberculosis. The lung trouble cleared up, the syphilis was relieved, but the patient died of carcinoma of the larynx. Fortunately, these cases are rare, but one of the most difficult things for the younger laryngologist is to differentiate between a tuberculous and a syphilitic ulcer. In the upper part of the larynx where the arytenoid cartilage is first involved in tuberculosis there is edema and infiltration; in syphilis it is simply an induration. This is a nice point sometimes. It is the rule in our office that all these cases are referred for blood examination.

I agree with the essayist regarding the treatment by silence. Psychologically it is not the best thing for the patient, although the average patient with tuberculosis is most optimistic. But I think our best results have been gained by placing the patient out in the open and putting the throat at rest by relieving the pain. It does not hurt so much to talk; the pain is on swallowing, and one of the most important things in these cases of tuberculosis of the larynx is to relieve the dysphonia and painful swallowing. The patient will not take nourishment because it hurts.

I have long since discontinued the electrocautery. Perhaps I did not know how to use it right. Perhaps I may go back and try it again.

Lactic acid has not given me the satisfaction that other remedies have. I never use nitrate of silver. In the painful ulceration of the upper part of the larynx nothing has given me such good results as a carefully applied 10 per cent solution of chromic acid. If it is carefully applied, I do not mean by spraying or swabbing, without its dropping into the larynx, you see the immediate effect upon the ulceration, and one application will relieve the pain for two to four days.

There is one other treatment that the essayist did not mention, and that is a local anesthetic for the patient to use fifteen minutes before taking any nourishment. Get rid of that dysphagia, the most depressing, horrible thing the patient can have. Take a 1 per cent solution of cocain, or a 4 per cent solution of novocain (which is probably better) with a 4 per cent solution of antipyrin. Let the nurse apply it by means of a spray first and the patient will soon learn to apply it better than the nurse, fifteen minutes before taking food or drink, and you will find he will not only swallow fairly well, but the anesthesia will remain for several hours.

Dr. C. L. Minor, Asheville, N. C.—I have for a long time stressed the necessity of the general practitioner's mastering the use of the laryngoscope so that these cases can be discovered early and thus sent to the laryngologist at a time when intelligent treatment will bring excellent results. Because in the past the general practitioner has not suspected involvement of the throat until there were symptoms of hoarseness, the laryngologists have usually gotten these cases in the advanced stages and have not seen their early forms, as the lung specialist, if he examines all throats, sees them. Hence the prognosis has been made much more severe than is justifiable. It should be generally recognized that no examination of a patient's lungs is complete unless his larynx has also been examined. It is true that many will be found normal, but in about 30 per cent of the patients early changes will be discovered in cases many of which are without throat symptoms, and an invaluable service will have been done the patient. I only hope that this influential body through its members will encourage the use of the laryngoscope by the general practitioner, for in this way there will come to them a much larger number of laryngeal cases than they now see, at a time when they can benefit them. Any intelligent doctor can learn to use the laryngoscope easily in one or two months' practice on every patient. And after he commands its use he can learn to recognize those early changes which have been spoken of here today, and can refer them at once for the proper treatment.

My only criticism of Dr. Mullin's pictures is that they represent advanced and not incipient changes, whereas we should dwell upon the early changes; for, like all other diseases, this disease is easily cured when it is incipient.

I heartily agree with Dr. Stucky in the frequent bad effects upon the patient's mental attitude of silence. Of course absolute silence is essential in some cases; but because a larynx is tuberculous is not in itself a reason for inaugurating the silence treatment, and today many doctors are pushing it too far. Moreover, the desirability of silence depends upon what part of the larynx is involved. If the edges of the cord are infiltrated or ulcerated, or if there is much infiltration or ulceration in the posterior commissure, talking is harmful and silence indicated; whereas in involvement of the false cords or the epiglottis, it is not at all necessary.

Some of you know that I am a firm believer, with twenty-six years of experience of the tuberculous larynx behind me, in the infinite value in tuberculous infiltrations of the insufflation of iodoform powder into the larynx before breakfast and at bedtime. As you recall, iodoform in the presence of living cells liberates that powerful anti-tuberculous remedy, nascent iodin, and this iodin liberated immediately on the diseased area penetrates the tuberculous tissue with remarkable effect. I have again and again seen bad tuberculous infiltration gradually dispersed under this simple treatment, which I teach the patient to carry out at home. It must not be given after meals, as it may nauseate. There are a few people whose tissues are irritated by iodoform, in which case, of course, it cannot be used. When, however, the process has reached ulceration I have not found it useful, but prefer my old friend lactic acid-glycerin or formaldahyde-glycerin.

To my mind it is very clear that the right treatment of the tuberculous larynx needs the cooperation of the internist or the lung specialist and the laryngologist. The former must learn to make early diagnoses and can legitimately treat the infiltrative stage. If the trouble has passed beyond this stage the patient should be sent at once to the laryngologist.

As regards the prognosis, I am distinctly optimistic. If the doctor will take the time and trouble to discover the changes early, and if he will study the larynx of every case that comes into his office and get for it intelligent treatment, he will have surprisingly good results. Naturally not all of these patients can be benefited, but whatever the treatment, washing the throat with good alkaline spray and then coating it with a spray of menthol eucalyptus gaultheria and hydrocarbon oil is, I believe, almost always invaluable. Handled in this way, bad dysphagia will not often be seen, and when seen I rarely find it intractable. When I do, my laryngological friends often help wonderfully by injection of alcohol into the nerves. Some of the worst dysphagia comes with the involvement of the epiglottis, and in such cases I am a great believer in the benefit of epiglottidectomy, which has worked wonders in many of my cases.

Dr. I. S. Kahn, San Antonio, Tex.—I see these cases from the point of view of the chest man, and it has always seemed to me that in infiltration of the larynx, as described by the laryngologists and men like Dr. Minor, the actual laryngeal pathology was not tuberculous. Many of the cases that recovered were cases of chronic non-tuberculous laryngitis, due to the mechanical irritation of coughing. In such cases as recover, recovery is really due to the treat-

ment of the lung tuberculosis, which gets rid of the cough. I have seen only one or two cases of actual tuberculous ulceration and dysphagia that recovered. I am very pessimistic when these cases reach the stage of ulceration of the larynx.

Regarding Dr. Stucky's point of the 4-plus Wassermann and the mixed infection, I believe from two or three unfortunate experiences I have had that a 4-plus Wassermann is not a tremendously infrequent happening in advanced tuberculosis of the larynx, and that ought to be taken into consideration in the handling of these cases. I have had three or four of this same type of advanced, hopeless lung cases with laryngeal ulceration with a 4-plus Wassermann where I could not get a history of syphilis. They were given arsphenamin, and it seemed to me the end was decidedly hastened. We had two or three of these in the base hospital at Fort Sam Houston during the war. The throat infection seemed to increase rapidly under arsphenamin.

Regarding the relief of pain, a simple measure has helped me in these dysphagia cases, and that is the use of aspirin locally in powdered form.

I have thought that I have obtained some relief in my cases of lesions located below the epiglottis by blocking the superior laryngeal nerve. Of course the nerve supply of the laryngeal nerve does not include the epiglottis. I am referring to a purely unilateral lesion lower down.

Dr. Benton N. Colver, Battle Creek, Mich.—The remarks of Dr. Minor with relation to the infrequent finding of dysphagia indicate that his patients are particularly fortunate in being under his careful observation so that they do not reach that stage. I am sure that a good many of the rest of us do get cases with this distressing symptom.

The pain in such cases indicates the same treatment as pain elsewhere, namely, rest, rather than the covering up of the pain by some sort of anesthetizing treatment. Based upon that opinion, we have tried out the use of the duodenal feeding tube. It has been used in our Clinic by the gastro-enterologist in feeding his ulcer patients.

Some time ago the gastro-enterologist referred to us a case which could not tolerate the retained duodenal tube. There was ulceration of the faucial pillars induced by the irritation of the tube. The patient sought relief from the sore throat. We accordingly passed a catheter through the nose and brought it out of the mouth. The upper end of the duodenal tube was then attached to the catheter and drawn back through the nasopharynx and out of the nose. The sore throat was promptly relieved and the tube was tolerated so well that we now use this avenue quite frequently. This avoids irritation of the tongue and faucial pillars, and by changing the tube from one side of the nose to the other about once a week, the nose is not irritated. We also use a few drops of mineral oil on the anterior end of the tube as it enters the nose once or twice a day. In cases of tuberculosis of the larynx with dysphagia the fluid and caloric need may be thus fully supplied and the patient given a deglutition vacation, analogous to the silence imposed on cases with dysphonia.

Dr. Jacob J. Singer, St. Louis, Mo.—As a man doing a great deal of chest work from the medical point of view it has been my custom not to look into the throat, as Dr. Minor suggested, for the reason that I had not been trained to look into the larynx. I have tried it every now and then, but I do not know much about it. But I am surrounded by so many good laryngologists that it seems folly for me to attempt to make any careful interpretation of what I see. And it is just as foolish for the laryngologist to attempt to examine the chest. A large number of men have told me that they ran over the chest hastily and found nothing. Of course they did not, any more than the average chest man would find anything in the larynx. But we do work in harmony, although unfortunately not closely enough.

I should like to ask the essayist to bring out the relationship of some of these advanced cases to removal of the tonsils. It has been my unfortunate experience to see a great many cases which have gone to the laryngologist first. He runs over the chest and finds nothing, but finds large tonsils, removes them, and within a few weeks there is extensive ulceration through the throat and in the larynx.

Dr. Mullin (closing).—When you talk about removing tonsils and clearing up foci of infection in the tuberculous, you must be careful; for if you say removal of tonsils means improvement, without qualifying that remark, tonsils will be removed wholesale, and God knows there are enough removed now. I have cases coming in all the time who have a very active tuberculosis, who have recently had their tonsils removed because they were told it would improve their general condition. As a matter of fact, they were just breaking down with tuberculosis, and it more than likely did them harm.

Dr. Minor's suggestion about the use of the laryngoscope is all right if a man learns to use it with dexterity, but a good many internists cannot, and if it is not within their ability to do it, then they should get some one to do it for them, some one to whom they can send their cases, who understands their language and who will understand just what the laryngologist means when he returns his report. Then you will have the cooperation I have been trying to bring out in this paper.

My only reason for using iodin over iodoform is that in Colorado it is very dry, and as it is our patients complain a great deal of the dryness of their mucous membranes. If we put a dry powder in the larynx, they are very uncomfortable.

I cannot agree with Dr. Kahn at all. In the first place, I have examined too many larynges pathologically to feel that they were not tuberculous. It would be very nice if it were true that they were due to irritation, but they are tuberculous. Dr. Kahn seems to think tuberculous laryngitis does not recover. I have been criticised for not showing in my slides earlier cases, and yet out of this series a great many recovered, and have remained well. My reason for showing slides of more advanced cases is to bring out

the point of classification. Some of these cases may seem advanced, yet there is something in the individual resistance. Dr. Dunham in his talk last night spoke of sensitized and non-sensitized cases, and some one else calls them the resistant and non-resistant types. I do not care what term you use, but you can not talk about early or advanced cases unless you classify them from the standpoint of their general condition as well. And then again comes the question of cooperation between the chest man and the laryngologist.

I mentioned blocking the superior laryngeal nerve in my paper, but it has its limitations. Dr. Joseph Green just told me of a case he injected, in which he obtained complete relief from pain. In three weeks he made a second injection with the same perfect results. The pain returned, and after the third injection, there was no relief from pain.

Dr. Singer asks about a general anesthetic in the removal of tonsils in the tuberculous, and Dr. Stucky suggests that where they have much lung trouble we do not give a general anesthetic. I should add to that, I do not give a general anesthetic at all. Do it with local anesthesia.

The pathologist in the hospital where I work told me the other day that he had just reviewed the last ninety-nine tonsillectomies I had sent in there, and that of those tonsils six were tuberculous. The proper thing to do is to go over the matter thoroughly with the patient's general physician, as he sees the patient more often than the laryngologist, and is better able to judge his resistance. Then if the indications for tonsillectomy are proper, send the case to the hospital, do it under local anesthesia with very careful technic and get him off the table as quickly as possible.

INDICATIONS FOR OPERATION ON THE MIDDLE TURBINATE*

By Harold Bailey, M.D.,
Springfield, Mo.

It must be quite obvious to all of us that this subject covers a field so large and so fertile as to preclude its thorough consideration in a paper of this length. We can, perhaps, browse over it together, picking a mouthful here and there and possibly find a few green bits that may be chewed and digested to advantage. The field is not a new one. It has been cultivated many times by the rhinologists of the past. Their gleanings have been exhibited in the literature from time to time, showing much wheat and some chaff. They encountered many snags, as was to be expected in breaking over new ground. Their work was made more arduous by the growth of noxious weeds. Their path was strewn with roses in the summer and with ragweed in the fall, as ours is today.

Many of the problems in connection with the surgery of the middle turbinate have been well threshed out and most of us are now in accord concerning them. There are some others in regard to which an exchange of ideas might be helpful.

The middle turbinate and its environment comprise a series of structures so at variance with any definite anatomical standard that no rules can be formulated that can in any way govern the operator. Good surgery of this region is determined by a knowledge of the anatomy, physiology and pathology, combined with a careful study of the patient's history and complaint. Each case is a problem in itself. A middle turbinate in one nose might be anatomically very small but pathologically extremely large, depending upon its surroundings. A turbinate three times the size might, in another nose, be physiologically normal. Again, the age of the patient may be a very important factor. The same operation might be considered imperative at twenty, but quite contraindicated at seventy.

To say that the turbinate has a definite physiological function in the way of assisting in the filtering, warming and moistening of the inspired air and, for this reason, should not be sacrificed, does not mean anything unless we see the kind of nose in which this particular turbinate has taken up its abode. The space may be insufficient even after the turbinal has been removed.

Persistent dryness of the nose after removal of the middle turbinate is something we hear a great deal about but seldom see. It can happen, however, in extremely spacious noses.

It is advisable in removing the middle turbinal to be very conservative in dealing with the inferior in the corresponding nostril. As a general rule it can be said that all operations upon the middle turbinate should be deferred until it is evident that non-surgical measures would be ineffective.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association. Fifteenth Annual Meeting, Hot Springs, Ark., Nov. 14-17, 1921.

It might be well to classify the indications justifying a surgical attack upon this structure under certain headings: first, conditions depending upon disease within the bone itself, intrinsic indications. Among these are those common to the ethmoid, of which the middle turbinal is, of course, a part. The bullous hypertrophy or bone cyst enlargement would come under this classification. This is in reality an enlarging ethmoid cell within the turbinal. These frequently become so large as to require removal of the turbinal. The chronic suppuration of the turbinal is usually in association with the same process within the ethmoid, as is also the chronic hyperplastic inflammation with polypi formation, and these are usually dealt with as a part of the ethmoid disease. The chronic forms of hypertrophy with excessive swelling of the erectile tissue may occur independent of the ethmoid proper.

The simple hypertrophy either with or without bone cell enlargement is frequently seen filling, in a measure, the concavity formed by a septal deviation. This is commonly considered a compensatory hypertrophy and often requires removal to make way for the straightening of the septum. Some of these large bony turbinals may be, in part at least, a factor in causing the septal deflection. Amputation of the anterior end of such a turbinal may suffice in some instances, but it is well to remember that the cutting through of the anterior end of a cellular turbinal, leaving a large bone cell exposed, is far more likely to result in post-operative infection than is the removal of the turbinal at its narrowest point of attachment, and the infection is prone to extend to the ethmoid proper.

Operations for the relief of symptoms resulting from the mechanical obstruction and turbinal pressure would include cases of headache due to pressure of the middle turbinate against the septum and the nasal wall. Headaches due to obstruction to the openings from the frontal sinus and ethmoid, including the vacuum headaches, certain forms of rhinorrhea and selected cases of hyperesthetic rhinitis would also come under this head.

Another group might comprise those requiring turbinotomy or turbinectomy as a preliminary to operations upon the frontal sinus, sphenoid, ethmoid or septum. Also for injection of the nasal ganglion in some noses a portion of the turbinal must be removed. It is not always easy, or indeed possible, to fix the cause of a patient's complaint on any one pathologic finding. This is especialy true of headaches, many of which are due to several factors. A man with a refractive error may strain his eyes the entire week doing close work and then get a sick headache on Sunday when he has not used his eyes at all. A slight indiscretion in his Sunday diet or a ride in the country may be the last straw, either of which alone would not have caused headache. And it follows, of course, that the removal of one of the several causes of a headache may be quite sufficient to cure that particular headache.

A headache that is prone to follow exposure to cold or dampness always suggests an intranasal origin, and if examination reveals a large and swollen middle turbinate wedged between the septum and the nasal wall, this turbinate immediately comes under suspicion. If a shrinking of the turbinate relieves the headache, or if the headache is absent when the turbinate is quiescent, then the suspicion becomes a conviction.

If the pain is at the root of the nose or across the forehead the evidence is still more conclusive. If, however, the headache is in the region of the occiput or parietal eminence and caused perhaps by an infection of the sphenoid or posterior ethmoid, then a removal of the turbinal would be disappointing.

Any anatomical blocking of the opening from the frontal sinus is prone to cause, some time or other, a frontal sinus headache, be that headache a vacuum headache caused by air absorption, or due to the presence of pus in the sinus. From the patient's standpoint the feeling is very much the same whether caused by secretions that cannot get out of the sinus or by air that cannot get in. Any acute infection may start the mischief. Treatment consists in restoring an interrupted drainage. Local applications, heat, etc.,

should first be tried in acute cases. These failing, a very useful procedure which often succeeds consists in prying the turbinal away from the nasal wall, causing a green stick fracture at its attachment and thus opening the frontal sinus and anterior ethmoid outlets. In the chronic cases, or cases having frequent recurrent acute attacks, most satisfactory results are often obtained by removal of all, or the anterior portion, of the turbinate. In some cases a septum resection followed by fracture of the turbinal may suffice. We often encounter the enlarged turbinal, either with or without septal deformity, where no apparent sinus trouble exists, where obstruction to respiration is the dominating symptom. Some of these turbinals are abnormal not only in size but in position as well. They may extend downward and backward to block the middle and most of the inferior meatuses, the posterior end of the inferior turbinal being crowded down to the floor. Their removal is indicated to free the respiration and as a prevention against future sinus or middle ear disease.

In noses with a deviated septum toward one side and an enlarged middle turbinal on the other, when operative interference is indicated, it is not always easy to decide whether to remove the turbinal that is crowded over by the misplaced septum or whether to straighten the latter. Merely to straighten the septum throws it over against the opposite turbinal and transfers the pathology from one side to the other. As the patient expresses it, "You have made the bad side better and the good side worse." If you do straighten the septum the removal of the turbinal that filled up the concavity is often indicated at the same time.

These are cases for symptom study and judgment and only apply to adults.

In children the problems are often more complicated. We do not like to resect a septum in a child. It is supposed to change the development of the nose. However, we need feel less hesitation in attacking the middle turbinal. The writer is loath to do it, but he has removed the middle turbinal frequently in children under eight with most gratifying results. In children we often find an edematous condition of the middle turbinates causing nasal obstruction. This may be entirely secondary to the presence of adenoids. The constant discharge results in a secondary middle turbinal inflammation. The removal of the adenoids in these cases is obviously indicated, after which the turbinal swelling, as a rule, gradually subsides.

Para-nasal sinus disease in children — and this is especially true of the antrum infections—is usually greatly relieved and often cured by the removal of tonsils and adenoids. Of course the tonsil removal probably plays only a minor role. The removal of the adenoids opens up the ventilation in the nose, gets rid of much secretion, and the secondary middle turbinal hypertrophy subsides. The sinus ostia again become patulent with resulting improvement in the infection. The same thing happens when these children are sent to a warm dry climate. The turbinal hypertrophy subsides just as it does in the summer time, and they are nearly always better. The irrigation of the noses of these children with bland alkali helps them, not by irrigating the sinuses, but by cleansing the middle turbinal and nasal wall of the irritating discharge, thus permitting a reduction in the swelling and affording an improved drainage. The children who get the best results from middle turbinectomy are those who suffer from asthma, from persistent headache, from rhinorrhea the year round, and occasionally it is useful in cases of nasal obstruction and sinus disease of severe extent.

I believe there is no one factor so prone to cause infection of the frontal sinus, antrum and anterior ethmoid as the misplaced or enlarged middle turbinate. The septal bend may start the trouble by crowding the adjacent turbinal, but we often see the infection on the opposite side.

In the negro race with the large, roomy nose one seldom encounters antrum infections except those of dental origin. You do not see drying or crust formation, either. Yet in some of these noses there is easily room for an extra turbinal, if a modest one.

Another class of cases that affords some food for thought is the group of hyperesthetic rhinitis or hay fever. Without attempting to offer any cure for this condition, whatever it may be, one can surely say that in many cases those most annoying symptoms of sneezing, lacrimation, rhinorrhea and nasal obstruction are greatly relieved by the removal in toto or in part of a middle turbinate. There is another group of cases characterized by symptoms almost identical but persisting throughout the year, where the turbinal misplacement or hypertrophy, if not the actual cause, is certainly the chief offender.

In operations upon the sphenoid it is often necessary to remove at least the posterior segment of the turbinate.

In radical operations upon the frontal sinus the removal of the anterior end of the turbinal constitutes a part of the operation. The turbinal operation alone, in the early stages of the infection, may make the operation upon the sinus unnecessary.

In disease of the ethmoid it is sometimes impossible even to make a diagnosis until the turbinal has been pushed aside or in part removed. In the radical exenteration of the ethmoid the turbinal may be left as it constitutes an important landmark. It may be removed as the last stage of the operation, or the posterior end may be left. In many operations upon the middle turbinal the posterior extremity of this body need not be sacrificed at all.

The association between turbinal hypertrophy and septal deviation with those common non-suppurative diseases of the middle ear, of nasal origin, are too well known to merit more than passing mention. Indeed, the danger to hearing is really one of the most urgent indications for surgical interference, always bearing in mind that a septal deviation high up as opposing the middle turbinal will interfere more with the inspiration of air than will one low down opposite the lower. The importance of the turbinals to the individual appears to increase from above downward. The uppermost crista suprema constitutes a mere bulging of an ethmoid cell and is not always present. The superior turbinate, while anatomically much the same, is nearly always present, but has a limited function. The middle, with all due respect to its physiology, is far from being indispensable, and it gets the individual into more trouble than do all the others combined.

In conclusion, it would seem that the actual value of this turbinate, and the same might be said of all the para-nasal cells, has been highly overrated. We hear much theory about the warming and moistening of air as it circulates through the para-nasal sinuses before reaching the lungs. Of course air does get into the sinuses and most of it remains there until it is stale before the lungs get even a taste of it. If these sinuses were intended for the circulation of air a few openings in their most dependent parts would have helped the circulation and drainage as well.

It is evident that the middle turbinate should not be blamed for all the trouble. It is an outer guard at the door of the antrum, anterior ethmoid and frontal, and is expected to watch everything going in and coming out. Personally, the writer has suffered so much from turbinal hypertrophy and sinus suppuration that he is convinced, in his own case at least, that he would have been better off without any sinuses at all.

DISCUSSION

Dr. George E. Adkins, Jackson, Miss.—The essayist asked if anybody had seen any contra-indication for correcting the septum of a child. I have. I have seen one in which the nose ceased to develop, and there is a small nose in a practically grown man now. When you meddle with the bony structure of a child's nose there are cases in which it will not develop any more and you leave practically a child's nose. I understand the same thing is common in removing the eye of a child, that the site will not develop further.

Dr. John T. Crebbin, New Orleans, La.—One important point which the essayist brought out is the size and pathology of the turbinate. This is a factor in determining whether it should or should not be removed.

Answering the question of performing a submucous resection on children under ten, personally I do not consider it advisable to do a complete resection. However, there is no reason why one should not remove the most deviated portion, remembering that the septum and nasal bones are not fully developed at ten years of

age. In this way, the correction will be made and Nature will take care of the rest.

Dr. Joseph Brown Farrior, Tampa, Fla.—I have never seen an indication for the removal of the middle turbinate without doing something else. That is as broad a statement as has been made about the turbinate. I do not believe there can be any operation upon the middle turbinate alone which will correct nasal degenerative conditions. We know, since we have had these papers on accessory nasal sinus disease, that anything that will produce symptoms in the patient which require help from our standpoint means that there is something back of that middle turbinate; and the middle turbinate, if it is diseased, has usually been diseased a long period of time before the patient consults a specialist. If it can be diseased alone I do not know anything about it. I should like some men who have had experience to speak on this, for I have had occasion to thank God that I came into this specialty after the days of turbinectomy, either inferior or middle. I have never done an inferior turbinectomy alone without going further, and I cannot see the need of anything there except the perforation of the anterior ethmoidal cells. You must clean that out, and I do know that these cases get relief by the complete exenteration of all of the ethmoid cells and possibly at the same time by making a larger opening into the sphenoid.

Dr. Joseph B. Greene, Asheville, N. C.—I appreciate the difficulty of determining whether we should remove the middle turbinate or straighten the septum to relieve certain nasal symptoms. I think in many cases a sub-mucous resection is better than removal of the middle turbinate. It is much better surgery to remove the middle turbinate than to crush it. It is equally simple and more effective. I find myself as I proceed in this specialty removing more of the middle turbinate instead of the anterior tip. I remove practically all of the middle turbinate with less reaction than removing the tip.

In certain cases of compensatory hypertrophy of the middle turbinate body, on the concave side of a deflected septum, it may not be desirable to do a complete turbinectomy lest there should result too large a nasal cavity.

Dr. A. C. Lewis, Memphis, Tenn.—Headaches are frequently caused by pressure from an enlarged middle turbinate. That is often overlooked by even the best specialists by not examining the roof of the nose thoroughly.

Dr. Farrior said he had never seen benefit from the removal of the middle turbinate alone. I saw about a year ago a lady from Lexington, Miss., who had suffered with chronic headaches for years. She had recently been to New Orleans to have her eyes examined by a good eye doctor. I do not know whether or not he looked into the nose. After the eyes were refracted and I found practically the same correction that she was then wearing, I examined her nose and found considerable pressure of the middle turbinate against the lateral wall. I removed a small part of the turbinate and she has had relief ever since.

Another case was more interesting. Eight years ago a lady came to me. I was the seventh specialist she had seen. She had had headaches ever since she was a child. After getting the history of the case, I examined her nose and found the middle turbinates much enlarged and hyperplastic. They were jammed in between the septum and the outer wall. There were numerous fibrous adhesions between the nasal septum and turbinate and between the outer surface of the turbinate and the lateral wall of the nose. I removed both turbinates almost completely. It was necessary to do this in order to remove the pressure. She was completely relieved. I heard from her a year afterward that she had had no return of the headaches.

It is often necessary to shrink the middle turbinates completely, using adrenalin and cocain. Shrink the middle turbinate thoroughly and pass a thin probe between the lateral wall and the turbinate and between the septum and the turbinate to see that there is no pressure at these points.

Dr. H. H. Briggs, Asheville, N. C.—I agree with the essayist that we do too much pruning of the inner structures of the nose, especially of the inferior turbinate.

The question of the indications for surgery of the middle turbinate is a question of pathology of the turbinate itself and that of the frontal and the spheno-ethmoid region. We should study the cases, both with x-ray and transillumination, and correlate the findings with the appearance of the structures and with the symptoms before deciding on the surgical indications.

I should like to take issue with my friend, Dr. Farrior, when he says that in every case of middle turbinate surgery he finds other surgery indicated. I frequently find the middle turbinate solely diseased. We find it in cases of asthma. We find it in a state of polypoid degeneration. We find it with small polyps hanging to it, and sometimes we find the ethmoid cells infected, and the removal of the turbinate alone without further surgery will in many such cases affect a cure. If there is a question as to the indications, the middle turbinate may, if involved or if obstructing, be removed and we may wait three to six months before other operative interference is found necessary, if at all. Often after waiting we are gratified to find that what at first seemed indications for radical surgery have disappeared.

Dr. Benton N. Colver, Battle Creek, Mich.—There seems to be no doubt as to the offender's role played by the middle turbinate; the question is whether to conserve or destroy. Our procedure has been to conserve. Practically no septal operation is complete without some sort of work upon the middle turbinate. If a thin middle turbinate is crowded laterally by a septal deviation the mere straightening of the septum will not in any way relieve the pressure and obstruction of that turbinate as related to the frontal, maxillary and anterior ethmoid ostia. After the septal work is done the middle turbinate should be infracted and placed midway between the lateral nasal wall and the new septal plane. At

the same time it may be desirable to remove the uncinate process. Also the turbinate may be found to be pathologically curved by its faulty position. If this is true, it may be straightened by compressing it with a flat-bladed forceps. This cracks the turbinate and straightens it until it hangs straight and on a plane parallel to the septum.

On the opposite or concave side of the septum we often find a large middle turbinate filling the concavity. This large body interferes with the restoration of the septum to its normal plane. The turbinate is usually of the so-called cystic type or one that contains an aberrant ethmoid cell. It is likely to extend laterally also, fitting too closely in to the hiatus semilunaris. Instead of removing the anterior quarter or third we have split this cell and have removed the lateral half of the anterior portion. This is easily done by puncturing the anterior end with a small knife. The incision may then be continued downward and backward and upward and backward to the limit of the cell. The removal may be completed either with the knife, the scissors or with the snare. This leaves the mesial half of the "cyst," which is convex toward the septum and concave laterally. This may be moulded by the compression forceps already mentioned. This leaves a straight, normally placed turbinate with a transverse thickness not more than one-third that of the original cystic mass. The lining mucosa of the cyst affords practically all of the lateral mucosa of the remodeled turbinate.

I wish also to mention the gradual changes toward normal that are very often observed in turbinates (both middle and inferior) following septal submucous resections. Before the septal operation an irritated turbinate swells and soon presses against the deviated septum, where it meets unyielding resistance. This resistance in turn irritates the turbinate and stimulates further swelling. It seems to be permanently hypertrophied. In other words, we find a vicious circle, swelling, pressure, resistance, irritation, etc. After the septum is operated upon the bony resistance is no longer there, and as the turbinate swells it meets a yielding wall (the membranous septum) and the swelling soon spends itself and subsides. After a few months of this freedom from mechanical irritation the turbinate has undergone marked subsidence in size and irritability. This suggests that too radical turbinate work might better wait on the benefit to be derived from the septal and conservative turbinate work. Often this benefit is not seen until quite a time has elapsed. It is better to do a minor amount of turbinate work at a later date, if it is found necessary, than to remove more than is necessary at the first operation.

Dr. Eugene L. Myers, St. Louis, Mo.—There seem to be two schools in St. Louis regarding the methods of treating these cases. Personally, I feel that unless a middle turbinate is frankly cystic or in the presence of pent-up pus it would be better, if a deflected septum is present, to straighten it and give Nature a chance to establish drainage. It is surprising to see some of these protracted intractable cases clear up after a high septum. In a personal communication from Dr. Sluder he quotes work from his clinic showing that septum operations *per se* allow the sinus condition to go "merrily" on.

I have taken a rather conservative attitude on the lateral wall operation and only do it after the septum has failed, as I consider the septum operation to be the lesser of the two operations and that it often brings good results.

Dr. Bailey (closing).—I agree with Dr. Myers that in many cases the thing to do is a septum resection, because that leaves the nose in a more normal condition.

Dr. Farrior spoke of never having seen any indications for operation upon the middle turbinate alone. There are many symptoms which are entirely due to pressure upon the middle turbinate. Sneezing is one of the commonest causes for which we remove the middle turbinate. The patient may have no other symptom but persistent sneezing due to pressure. In frontal sinus infection, subacute, if they do not recover they become sufficiently better to be comfortable by having the middle turbinate cleaned up if not removed entirely.

I think partial resection can be done in some cases if you only need a slight reduction in size. The same thing could be done by crushing the turbinate, getting rid of the bony cells, and allowing the soft parts to remain.

Southern Medical Journal
JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Alabama. Annual subscription $3.00. Single copies 25c each.

Entered as second-class matter at the Postoffice at Birmingham, Alabama, under Act of March 3, 1879 Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917 authorized December 20, 1921.

DR. M. Y. DABNEY, Editor
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Vol. XV JUNE 1922 No. 6

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Sixteenth Annual Meeting, Chattanooga, Tennessee, November 13-16, 1922

DIAGNOSTIC VALUE OF BLOOD-SUGAR DETERMINATIONS

If one glances over the literature of the experimental work which has been done upon methods for the determination of sugar in the blood or urine and the clinical application of these methods to diabetes, the pre-diabetic state, and other pathological conditions, one is appalled at the years of time and the magnitude of effort which have been spent upon these subjects, and more appalled at the length of time and strength of effort which are yet to be spent before many positive statements can be made. One feels that science has become too hard, that its laboriousness constitutes an almost insurmountable barrier to success.

If we turn to the work which has been done and which is yet to be done upon the endocrines, "We fall upon the stones of life—we bleed." How can all of these problems be solved before the genus homo is extinct?

Yet the knowledge won in the past has been well worth while. It is the apparently plodding work, the numbers of repeated experiments and collected cases which have produced brilliant results, not effortless inspiration.

The blood-sugar curve in various diseases has been shown to be of diagnostic value and its routine determination is sufficiently simple and accurate to be carried out in most laboratories. It is determined usually as follows: a given quantity of glucose, usually measured according to the body-weight of the individual, is given on a fasting stomach, preferably with water and lemon juice. The blood-sugar is estimated by a standard method just before the ingestion of the glucose, one hour, two hours, and usually three afterward; and from that the blood-sugar curve is plotted. There is normally a sharp rise in the blood-sugar one hour after the ingestion of the glucose, which falls to the normal for the individual in two or three hours.

The glucose tolerance of the individual is an entirely different thing. It is determined from analysis of two-hour specimens of urine before and for several periods after a somewhat similar glucose meal upon a fasting stomach. This has been shown with some conclusiveness to have a bearing upon the individual's tendency to diabetes. In the original paper upon this subject[1] it was the hope of the authors to study first normal individuals to devise a normal standard of the pre-diabetic state. Individuals diagnosed as pre-diabetics could be warned and given advice to prevent development of the malady. For absolute proof, it is necessary to do blood-sugar tests on suspected individuals and follow their cases till they are later proven to have diabetes. This is, of course, difficult, but a few instances of the kind have been recorded. Enough proof of the theory has been given to make it well worth consideration and further

(1) Benedict, Osterberg, and Neuwirth: J. Biol. Chem., Vol. 34, 1918, pp. 217-262.

trial. It may be of interest to know that one of the large life insurance companies gave this glucose tolerance test meal to an applicant, who was promptly thrown into a diabetic coma, from which he barely recovered. However, he no longer needed to take out the insurance, for the company was forced to pay him fifty thousand dollars.

It has been suggested, and experimental evidence has been given to prove, that the blood-sugar curve is of value in determining malignancy: that in a malignant tumor the blood-sugar remains high after the glucose test meal, often for twelve hours, instead of showing a return to normal after two hours.

A recent report[2] of a study of two hundred cases, chiefly in a hospital, of blood-sugar curves offers the following conclusions:

"The pathologic conditions in which the form of the blood-sugar curve is usually within certain limits constant are: (1) hyperthyroidism and hypothyroidism, (2) hypopituitarism, and (3) diabetes mellitus."

Typically, the internal secretion of the thyroid has two influences: delay of glycogenesis or increased glycogenolysis; and it stimulates metabolism. Thus in the clinical cases of hyperthyroidism the blood-sugar is high one hour after the glucose meal, but falls rapidly back to normal. Cases which are clinically hypothyroid frequently show very little increase in blood-sugar either one, two, or three hours after meals.

Some of these cases very quickly show a steep curve when under treatment.

Cases of hypopituitarism have low curves, i. e., the blood-sugar rises little after the glucose meal.

In diabetes mellitus the curve rises very high in one hour and remains high for some time afterward.

The blood-sugar determination should be of value, then, taking into consideration always other clinical and laboratory findings, in the differential diagnosis of these conditions.

As the above report[2] included but two cases of malignancy, it cannot be said to contradict the statement that this test is valuable in distinguishing between malignancy and benignancy.

Blood-sugar determinations are helpful adjuncts and should be routinely employed in working up all obscure cases.

(2) Olmsted, W. H., and Gay, L. P.: Arch. Int. Med., Vol. 29, No. 3, 1922.

LOUISIANA'S NEW MILK COMMISSION

The regulation of railroads and other public utilities by boards and commissions has been common in all the states for a generation or more. Only recently have communities begun to realize that it is quite as important for states to regulate the production and distribution of some of the more vital foodstuffs which, though not so completely monopolized, perhaps, as transportation, gas and electricity, are just as much in need of state control to insure the public against the evils of wasteful competition and indifference to public welfare.

One of these vital foodstuffs is milk. During the World War the Food Administration appointed two or three Milk Commissions in the cities of New York and Chicago and in the State of Ohio. Detroit also had a Milk Commission appointed by the Governor of Michigan. These commissions made investigations as to the cost of milk to the producer and the various elements in distribution, and made suggestions toward means by which costs of distribution might be lowered.

In Pennsylvania, Maryland and Delaware, a Tri-State Milk Commission appointed by the governors of the three states had done a similar work before the war. Clyde L. King, of the University of Pennsylvania, is still acting as Milk Price Arbitrator for Pennsylvania and Maryland.

Connecticut, five years ago, enacted a law creating a Milk Regulation Board which has functioned so successfully that Louisiana has now begun to experiment along the same lines. This Board is created with a view to controlling not the price, directly, but the conditions under which milk is produced and sold in the State, to protect the public from unsafe and insanitary milk, and to produce the standards as well as the methods in the milk business.

In order to make the work of the Board as broadly intelligent as possible, as well as to insure its fairness to each branch of the milk industry, its personnel is made up of the following representatives of producer, distributor and consumer: the State Commissioner of Agriculture, the Director of the State Agricultural Experiment Station, the President of the State Board of Health, the Secretary of the State Dairymen's Association, and one milk distributor.

This Board in Connecticut holds public hearings, at which rules and regulations for the production and distribution of milk in the State are fixed. It has the power to inspect dairies and all other places where milk is sold, and to require cattle to be tested, as well as the milk they produce. It can fix standards for milk of different grades and though these are optional when fixed by the State Board, they may be made positive by ordinance of any city.

"There is no question about the control's being more complete than by any other method," says the Connecticut Dairy and Food Commissioner, Thomas Holt. "The Dairy Commissioner can get better results with rules made by a board than he could by rules formulated by himself, which might be deemed autocratic. It is certainly more economical to have one set of inspectors controlling dairy sanitation than by each city's having its own inspectors. Our inspectors are experienced men, and have not been subject so far to political influence. The consumer is receiving the greatest benefit from the safeguarding of his health, which was the prime reason for the establishment of the system. It is an unqualified success so far as we have been able to determine."

In Louisiana the Milk Regulation Board, created by Act 66 of 1920, amended by Act 27 of 1921, has only just been organized. At its first meeting, the representative of the State Board of Health was chosen Chairman, and the regulations of the Health Board adopted as the sanitary rules of the new Board, thus fixing its attitude on the fundamental problem of sanitation. Further hearings will no doubt establish grades and discuss marketing and transportation conditions.

It is, of course, too early yet to predict how this body will succeed in this State, where conditions are very different from the states in the East where similar bodies have functioned. But one feels safe in asserting that it will have one wholesome result—that of bringing producers and distributors together to talk over their common problems, and to learn of the men of science how to bring cleaner and safer milk at the lowest possible price to the consumer.

Considering the paramount value of milk in the dietary of today, especially in that of children, this result will be worth to Louisiana many times the cost of this new Board.

THE GORGAS MEMORIAL

Sir Auckland Geddes, the British Ambassador to the United States, recently left his official duties in Washington to deliver addresses in Birmingham, Montgomery and Mobile in the interest of the campaign for funds to endow the Gorgas Memorial. Sir Auckland's tribute to a great Southerner, the lamented Major-

General William Crawford Gorgas, was remarkable, not only in that one of the greatest of Great Britain's illustrious men should give up a week of his time for such a cause, but in his expressions regarding the achievements of a man from a country other than his own. Sir Auckland said:

"The present era will go down in history as the dawn of the age of sanitation; and in the centuries to come, when school children will confuse the military leaders of the World War with those of the Napoleonic wars, the name of Gorgas will stand out as the greatest man of this time."

Sir Auckland also pointed out the duty of the present generation to make secure the legacy that General Gorgas left to the world by carrying out his methods of sanitation until tropical diseases have been eradicated from the world as has been done in the Canal Zone. He expressed the opinion that the proposed Gorgas Institute of Tropical Diseases in Panama and the Gorgas School of Sanitation in Alabama, if properly endowed, would play an important part in making other areas of the world as healthful places in which to live as Gorgas made of the tropical jungles of Panama.

Accompanying the British Ambassador in his pilgrimage to the native state of Gorgas, was the distinguished Minister of the Republic of Panama, Hon. J. E. LeFevre. He said that the people of his country felt that Gorgas left to them his greatest heritage and that as an evidence of their appreciation his Government was providing a site adjoining the celebrated St. Tomas Hospital, in Panama City, and that an appropriation of $500,000 had been made to erect a building for the Gorgas Institute of Tropical Diseases. He called Gorgas "the Savior of the Tropics" and said that the people of the Central and South American Republics would do their part in raising the $6,000,000 endowment for a great international memorial to Gorgas.

The campaign for funds for the Gorgas Memorial has already been launched in Alabama. It is being led by the physicians of the State who know best the achievements of General Gorgas, and who also understand the great good to mankind that will result from establishing complementary institutions, one for research in tropical diseases in Panama, and the other in Gorgas' home city for training practical sanitarians. The physicians of Alabama are not only subscribing liberally, but they are explaining to the public that the Institute of Research in Tropical Diseases and the School of Sanitation will "carry on" the work of Gorgas in saving human lives.

The Alabama State Medical Association, at its recent meeting, passed resolutions endorsing the Gorgas Memorial and inviting each of its 2000 members to secure a subscription of at least $200 from the people of their communities.

A movement has been begun by Dr. G. E. de Schweinitz, President of the American Medical Association, and Dr. Franklin Martin, Secretary-General of the American College of Surgeons, to form a club of 1000 doctors who will subscribe $1000 each to the Gorgas Memorial.

The American Medical Association and the Southern Medical Association have endorsed the Gorgas Memorial, as have all the state medical associations to which the matter has been presented; and physicians will surely do their part to raise funds to perpetuate the memory and the work of the greatest man that America has given to sanitation. If great diplomats and the peoples of other countries can do so much in honor of Gorgas, surely the public of the United States will respond to a call that not only honors an American, but one which by making the world healthier, will add vastly to its material wealth.

Book Reviews

Version in Obstetrics. A Description of the Potter Method. By Irving W. Potter, M.D., F.A.C.S., Obstetrician-in-Chief, Deaconess Hospital and St. Mary's Maternity Hospital; Attending Obstetrician, City Hospital; Consulting Obstetrician, Columbus Hospital, Buffalo Homeopathic Hospital and Salvation Army Home, Buffalo, N. Y. 140 pages 6¼x9½, with 42 original engravings, many in two colors. St. Louis: C. V. Mosby Co., 1922. Price, silk cloth, $5.00.

The meat of the text is contained in the one chapter, "The Author's Technic of Version," the remainder of the book being an elaborate review of the history of version work and answers to the criticisms directed at the author's technic and records. One gets the impression throughout that version is a panacea for all obstetrical ills and therefore an armament without limitation except in the two instances cited by the author, viz: transverse position with threatened rupture of the uterus and tetanically contracted uteri. The matter as presented by the author precludes all ideas of spontaneous deliveries. It virtually throws into the discard the art of pelvimetry and substitutes for accurate prenatal fetometry the judgment of the operator after he has inserted the hand into the uterine body and ruptured the membranes. The actual technic of the author may have great merit, but the scope of usefulness of the Potter method of version will be accorded distinct limitations as the accoucheur, in many instances, will refrain from intrauterine manipulations as a time-saving, labor-saving and pain-saving device.

The Management of the Sick Infant. By Langley Porter, M.D., M.R.C.S., Professor of Clinical Pediatrics, University of California Medical School; Visiting Physician, San Francisco Children's Hospital; Consulting Pediatrician, Babies' Hospital, Oakland, etc.; and William E. Carter, M.D., Assistant in Pediatrics and Chief of Out-Patient Department, University of California Medical School; Attending Physician, San Francisco Hospital, etc. 654 pages, with 52 illustrations, mostly original. St. Louis: C. V. Mosby Co., 1922. Price, silk cloth binding, $7.50.

This work represents a departure from the traditional text book on diseases of children in that it confines its scope to the diseases of infancy and does not include childhood as distinguished from infancy.

The whole field of the disorders and diseases of infancy is covered and well covered and is evidently based upon a large experience and knowledge of the subject. The question of feeding, whether of well or of sick children, is handled in a broad spirit and is not characterized by any sectional or merely local views or school. Breast feeding is, of course, given the preference over all other methods, when available.

In the classification of intestinal disorders agreement is not to be expected, and here authors should have the usual liberty of trying out their hands in this most difficult field.

A section of the work is devoted to methods of diagnosis and of treatment and is especially well illustrated for the purpose of making the context more plain. This lucid exposition of the different measures of diagnosis and treatment should prove of real value to men not constantly putting into execution the various procedures.

A return to former usage is found in a list of suggested prescriptions for various conditions and disorders. These are given as suggestions and generally, as was Dr. A. Jacoby's habit, are prefixed with a "may be given" rather than a "should be given."

The work is well presented, is highly practical and should prove of value.

Urine Analysis and Diagnosis by Microscopical and Chemical Examination. By Louis Heitzmann, M.D., Formerly Professor of Pathology and Bacteriology, Fordham University School of Medicine, New York. Fourth revised and enlarged edition. 362 pages with 131 illustrations. New York: William Wood & Co., 1921. Cloth, $4.00.

The general plan of the contents is a detailed outline of chemical examination for normal and abnormal contents of the urine, and then a description of the microscopic examination. The third part presents the microscopic urinary diagnosis of the usual kidney and bladder pathology. The concluding chapter is on the determination of functional efficiency of the kidneys, written by Dr. Walter T. Dannreuther. This is a very instructive article. The whole book is an excellent laboratory guide, and presents the subject clearly.

Tuberculosis in Infancy and Childhood. Lectures Delivered at the Children's Hospital, Philadelphia, under the Auspices of the Philadelphia Pediatric Society. By J. Claxton Gittings, M.D., Professor of Pediatrics, Graduate School of Medicine, University of Pennsylvania; Visiting Physician, Children's Hospital, Philadelphia; Assistant Pediatrist, University Hospital; Frank Crozer Knowles, M.D., Professor of Dermatology, Jefferson Medical College; Clinical Professor Dermatology, Woman's Medical College, etc.; and Astley P. C. Ashhurst, M.D., Associate in Surgery, School of Medicine, University of Pennsylvania. 1273 pages with 23 illustrations. Philadelphia and London: J. B. Lippincott Co., 1922. Cloth, $5.00.

This is a convenient and worth-while book to the student, general practitioner, pediatrist, and those interested in this important phase of tuberculosis. Its smoothness of diction, its logical sequence in developing and drawing conclusions are excellent. It is not burdened with theories and superfluous arguments. The chapter headings are unusually well selected. The chapters on glandular and pulmonary tuberculosis are the best and most complete that have recently appeared. The chapter on bone tuberculosis has more valuable material and less superfluous matter than usual.

The treatise is a well systematized monograph. It is a pioneer work, is readable from cover to cover, and is gotten up in a pleasing style.

Life and Times of Ambrose Pare. With a New Translation of His Apology and an Account of His Journeys in Divers Places. By Francis R. Packard, M.D., Editor of Annals of Medical History, New York. 297 pages with 22 text illustrations, 27 full page plates and 2 folded maps of Paris of the sixteenth and seventeenth centuries. New York: Paul B. Hoeber, 1921. Cloth, $7.50 net.

Rarely has the reviewer encountered a more absorbing historical and biographical sketch than the work under consideration. In an age of conquest, intrigue and religious persecution, Pare lived a life of hardship and excitement interspersed with forced opportunities for study, experiment and writing. His revolutionary treatment of wounds without the use of boiling oil and his application of the ligature to amputations to render his name immortal.

"Ambrose Pare was more than a great surgeon; his reputation for honesty and sagacity was such that he became the confidant and counselor to many of the courtiers and soldiers with whom he came in daily contact."

The book is not a mere chronicle of events in Pare's life; it is overflowing with bits of French history and anecdote.

It is charmingly written and is most deserving of a hearty reception.

The Genuine Works of Hippocrates. Translated from the Greek with a Preliminary Discourse and Annotations. By Francis Adams, LL.D., Surgeon. Two volumes in one. Vol. I, 336 pages. Vol. II, 366 pages. Illustrated. New York: William Wood & Co.

"The design * * * of the * * * work is to give a translation of all the genuine remains of the Great Hippocrates, along with such an amount of illustration as may be sufficient to render them intelligible to any well-educated member of the profession at the present day."

None but one possessed of scholarly attainments could edit a text of this kind. The annotations are very full and clear and greatly elucidate the work.

One cannot read Hippocrates without marveling at his modernness and accurate clinical observation even when measured by the standards of today.

The translation is carefully made and the commentary full.

The work is one to be desired by all who regard medicine as more than a bread-winning vocation, and who are interested in the pioneer views of one of the greatest minds that ever adorned the profession or that the world has ever known.

Hayfever and Asthma, Care, Prevention and Treatment. By William Scheppegrell, A.M., M.D., New Orleans. 274 pages, 107 engravings, 1 colored plate. New York: Lea and Febiger, 1922. Cloth, $2.75.

Dr. Scheppegrell, President of the American Hayfever Prevention Association, is one of the recognized authorities on hayfever and asthma, and so this first edition of his work commands the respect and approval of the profession. No disease is more distressing, and the profession is unfortunately too helpless in giving relief. A better source of information could not be had than this little book.

A Text Book of Practical Therapeutics. With Especial Reference to the Application of Remedial Measures to Disease and Their Employment Upon a Rational Basis. By Hobart Amory Hare, M.D., LL.D., B.Sc., Professor of Therapeutics, Materia Medica, and Diagnosis, Jefferson Medical College, Philadelphia; Physician to Jefferson Medical College Hospital; One-Time Clinical Professor, Diseases of Children, University of Pennsylvania; Commander, U.S.N.R.F. Illustrated with 144 engravings and 6 plates. 1068 pages. 13th edition. Philadelphia and New York: Lea & Febiger, 1922. Cloth, $6.50.

The fact that this book has been through 17 editions speaks for its acceptance by the medical profession as a serviceable work.

The text has been carefully revised and many additions added under the various headings. The sections on blood transfusion and renal disease have been largely rewritten.

The author has retained the original manner of presenting the subject which makes it still a ready reference book for the busy practitioner. He has added comments and sound advice upon the newer therapeutic procedures.

The Clinical Method in the Study of Disease. By R. M. Wilson, M.B., Ch.B., Late Assistant to Sir James MacKenzie under the Medical Research Committee, Cardiologist to the War Office, Trench Fever Committee, Consulting Physician to the Ministry of Pensions. With a biographical note on the life of Dr. Horace Dobell. One frontispiece, 56 pages and bibliography of Dr. Dobell's contributions to medical literature. London and New York: Oxford University Press, 1921. Cloth, $1.50.

This little book is written to urge the use of clinical observation and study in the management of cases. Dr. Wilson is well-trained in laboratory methods and their interpretations and therefore is in a position to state what limitations we should place upon laboratory reports.

He stresses the fact that the laboratory can tell us what is the cause of the pathology, but that in the living it does not give us the data needed to make the prognosis.

The book is well written and the style pleasing.

Surgical and Mechanical Treatment of Peripheral Nerves. By Byron Stookey, M.D., Associate in Neurology, Columbia University; Assistant Professor of Neurosurgery, New York Post-Graduate Medical School and Hospital. With a chapter on Nerve Denegeration and Regeneration by G. Carl Huber, M.D., Professor of Anatomy, University of Michigan. Octavo volume of 475 pages with 217 illustrations, 8 in colors and 20 charts. Philadelphia and London: W. B. Saunders Co., 1922. Cloth, $10.00 net.

This is an important and not too well known subject. Operations have often been undertaken upon peripheral nerves based upon "unsupported opinion," rather than upon sufficient knowledge and consideration of anatomy and embryology. Particularly the microscopic anatomy must be known.

The work discusses anatomy, nerve degeneration and regeneration, methods of nerve repair including methods to be discarded. Treatment of different nerves is discussed in detail, and nerves frequently injured are grouped together and considered. The author does not advocate the use of nerve crossing in anterior poliomyelitis. There is a full index.

This is an inclusive, accurate, and very useful work by a man well able to handle the subject.

Text Book of the Principles and Practice of Nursing. By Bertha Harmer, B.Sc., Columbia University; R.N.; Instructor of Theory and Associate Instructor of Practical Nursing, St. Luke's Hospital Training School for Nurses, New York; Formerly Instructor of Theory and of Practical Nursing, and Supervisor of Nurses, The Toronto General Hospital Training School for Nurses, Toronto, Canada. With 693 pages, illustrated. New York: The Macmillan Co., 1922.

This book is well named "Principles and Practice of Nursing," for it aims to give not only the technical procedure of nursing but the fundamentals for each, without which no nurse can see beyond the brief horizon of her routine tasks. The material is in two main divisions: one, care of medical patients, the other of surgical. There are several chapters upon the hospital bed, wards, admission of new patients, etc., upon the routine daily attention to the patient, observation of the cardinal symptoms of temperature, pulse and respiration, and full discussions of nursing in different specific troubles. The last chapter contains a full description of nursing in diseases of the eye, ear, nose and throat.

It covers the field of nursing fully and ably.

The Thyroid Gland. Clinics of George W. Crile and Associates. Edited by Amy F. Rowland. With 287 pages and 106 illustrations. Philadelphia and London: W. B. Saunders Co., 1922. Cloth, $5.00 net.

The chapters of this work were written by different contributors upon various phases of the treatment and theory of the normal and pathological thyroid gland. The following general points, among others, are taken up and developed: that goiter is endemic, a deficiency disease, and preventable by proper medication, that the body is "an electrochemical mechanism in which the conductivity, hence oxidation, is controlled by the thyroid."

The surgical treatment of hyperthyroidism is described. Different disturbances associated with diseases of the thyroid gland, such as cardiac disturbances and those of laryngeal function, and differential diagnosis of various diseases of the thyroid are treated. Chapters of interest by Dr. Crile himself are "Function of the Thyroid," "Physical Interpretation of the Role of the Adrenals in Exophthalmic Goiter," "Partial Hyperthyroidism," "Surgery vs. X-ray in the Treatment of Hyperthyroidism," "Technic of Operations on the Thyroid Gland," and upon post-operative treatment and complications.

The book is worthy of the past excellent work of the Crile Clinic upon this subject.

Principles of Medical Treatment. By George Cheever Shattuck, A.M., M.D., Assistant Professor of Tropical Medicine, Harvard Medical School; Formerly Assistant Visiting Physician, Massachusetts General Hospital. Fifth revised edition. 309 pages. Boston: W. M. Leonard, Inc., 1921. Cloth, $3.50.

This book forms one of the valuable "Case History Series" with which the profession is familiar. Originating from compilation of lectures, it has become enlarged through five editions, until this edition has developed into a large and useful work. The contributions from several recognized authorities on selected topics make the book extremely valuable. The general plan is simply an outline of the principles of medicine concerning each disease and suggestive therapeutics. It is a ready reference book. Such subjects as nephritis, acute infectious diseases, acute infections of the respiratory tract, gastro-intestinal disorders and therapeutics are excellently outlined by the author. There are additional chapters by J. B. Hawes on tuberculosis; acute infectious diseases most common in childhood by E. H. Place; influenza, by Gerald Blake; diabetes mellitus, by B. H. Ragle; and serum treatment of pneumonia by Henry M. Thomas.

Report of the Scientific Work of the Surgical Staff of the Woman's Hospital in the State of New York. Edited by George Gray Ward, Jr., M.D., F.A.C.S., Chief Surgeon. With 195 pages, illustrated. Volume III, 1920.

This volume consists of 19 monographs upon the research work and clinical studies conducted by the hospital staff. The subjects are of interest to the surgeon, particularly to the gynecologist. They show the value to the medical profession of the hospital organized along the lines laid out by the American College of Surgeons, which requires careful records of all hospital cases. It is primarily statistical and contains reports of results of carefully classified cases, with percentages of favorable or unfavorable results with different methods of treatment, and brief conclusions.

There are fifty cases of ectopic gestation; 205 cases showing the use of the intrauterine stem pessary; 270 cases of dry labor, and other groups as well as single unusual cases. The book contains comparatively little theory but an abundance of well chosen and well presented facts, and some very good illustrations.

The Mechanics of The Digestive Tract. By Walter C. Alvarez, M.D., Assistant Professor of Research Medicine, University of California Medical School. 192 pages, 22 illustrations. New York: Paul B. Hoeber. Cloth, $3.50.

A unique piece of work is represented in this description of the mechanics of the digestive tract, a study of which was stimulated by casual observation of difference in irritability in different parts of the bowel, this difference being graded downward as food progresses in the bowel. This is associated with a graded rate of rhythmic contractions, which has suggested to the author his "gradient theory." The myogenic nature of rhythmic contractions is satisfactorily presented, though full credit is given to the role the nerves play. This theory is applied to many of the common gastro-intestinal symptoms. It is a plausible and interesting theory, and should receive deserved consideration. It is a splendidly written and valuable recent contribution to gastro-enterological literature.

Radium Therapy. By Frank Edward Simpson, A.B., M.D., Professor of Dermatology, Chicago Policlinic; Adjunct Clinical Professor of Dermatology, Northwestern University Medical School; Attending Dermatologist to Mercy Hospital, Alexian Brothers Hospital, Henrotin Hospital, etc.; Former President American Radium Society; Former Vice-Chairman, Section of Dermatology and Syphilology, American Medical Association; Director of the Frank Edward Simpson Radium Institute. 391 pages, with 166 original engravings. St. Louis: C. V. Mosby Co., 1922. Cloth, $7.00 net.

This monograph by Dr. Simpson evidences the very mature experience he has had in the practical use of radium covering a period of several years, and reflects much credit in showing how thoroughly conversant he is with radium therapy in its various ramifications.

The first chapters take up the history of radiant energy, the x-ray being given first mention as the pioneer in this field. The discovery and isolation of radium is given due consideration. The physics and biological effects of radium are dealt with rather comprehensively. This is the foundation of the intelligent use of radiant energy, and if there is any criticism that might be made with reference to Dr. Simpson's book, it is that he does not also consider the physics and biological effects of the x-rays as well. However, this could hardly be considered a just criticism, as he has absolutely confined his remarks to his text.

Dr. Simpson advises, in the treatment of epithelioma of the lower lip, the use of from 200 to 300 mc. of radium. He says, further: "One should radiate an area extending several centimeters beyond the visible disease. Certain tumors should be attacked from the superior, the internal and the external aspect of the lip. Six hundred mc. hours may be given to an area of 4 square centimeters." There is no criticism of this method of treatment so far as its merit is concerned, but in order to do this it is necessary to have either an emanation plant or to possess at least 200 to 300 milligrams of radium element. Furthermore, even with this quantity of radium, it requires from three to four days of continuous treatment to complete the one application. Therefore, it is hardly practicable as a routine treatment except where radium emanation is available, and even then its practicability is questionable as compared to the judicious use of radium and x-rays in combination. By using both radium and x-rays the length of treatment can be very materially shortened, a smaller quantity of radium may be effectively used, and a much larger number of people may be benefited than would otherwise be possible at the present time. Furthermore, the superiority of radium used alone in such cases has not been proven. Dr. Simpson further says: "Radium treatment is probably the method of choice in the treatment of leukemia at the present time. It sometimes succeeds in producing remissions when all other methods, including the use of benzol and x-rays, have failed." This is a matter of opinion. Some of the best workers are using x-rays from choice with apparently just as good results and much less trouble to the patient. In a large number of conditions that are more or less amenable to radiation treatment, radium pre-eminently occupies first place, among which may be mentioned carcinoma involving the uterus, bladder, larynx, esophagus, etc.; also, in cases of malignancy in which the implantation of radium is desirable, as in recurrent carcinoma of the breast.

It is impossible in a book of this character and of this size to discuss in detail the various steps of treatment, and the pathology incident to the various conditions considered, yet the principal points are well brought out.

As a general text book dealing solely with the therapeutic application of radium, this volume fills a vacancy that has heretofore existed in American medical literature. The conservative tone of the book, coming from a man of Dr. Simpson's experience and reputation, together with the excellent illustrations showing cases both before and after treatment when possible, will doubtless tend to dispel the skepticism that exists in certain quarters, and at the same time mitigate undue enthusiasm that has been engendered by the extravagant claims of unscrupulous and inexperienced workers. A very complete bibliography is appended which should serve a useful purpose to those who are especially interested in the subject.

The International Medical Annual. A Year Book of Treatment and Practitioner's Index. Fortieth Year. New York: William Wood & Co., 1922. Cloth, $5.00.

From the forty years of service to the profession, this excellent work is generally known and appreciated. The introduction contains a review of the most important facts in all branches of medicine that have appeared in medical literature during the past year. The Dictionary of Practical Medicine, by many eminent contributors, includes every phase of medicine. It affords one an ideal means of reviewing medical progress.

A Manual of Clinical Laboratory Methods. By Clyde Lottridge Cummer, Ph.B., M.D., Associate Professor of Clinical Pathology, School of Medicine, Western Reserve University; Associate Clinical Pathologist, the Lakeside Hospital; Director of Medicine and Visiting Physician, St. John's Hospital; Director of Laboratories, St. Alexis Hospital, Cleveland, Ohio. Illustrated with 136 engravings and 8 plates. 484 pages. New York and Philadelphia: Lea & Febiger, 1922. Cloth, $5.50.

In his preface the author states that the manual is written for students and practitioners and that his aim has been to present the laboratory methods in concise and accessible form. In this he has succeeded, for the book is so arranged that it is easily used as a text book by the student or as a working manual by the practitioner.

The author has adopted the plan of treating each subject under the following headings: outline of routine examinations, description of simple qualitative methods frequently employed, description of quantitative methods or those of intricate technic, and discussion of findings in various morbid conditions.

Certain sections are not covered in the same detail as others. The section on disease in which the blood contains parasites is not up to the standard of the rest of the book.

A full bibliography of text books and monographs is added which will be of great value to the student.

Hyperpiesia and Hyperpiesis. A Clinical, Pathological and Experimental Study. By H. Batty Shaw, M.D., F.R.C.P. Oxford Medical Publications. 191 pages, illustrated. New York: The Oxford Press, 1922. Cloth, $6.50.

This is the first edition of a book on a subject full of much interest and many problems. Much has been written on high blood pressure, its significance and management. Since the kidneys have been accused of being responsible for most idiopathic hypertensions, this work is of special interest. In section I, the clinical reports and pathological findings in a large series of cases are carefully presented and tabulated. Section II contains an analysis of clinical and pathological details of the 47 cases studied, with notes on modes of death, as uremia, terminal infection, cardiac failure, etc. Section III discusses the origins of hyperpiesis and of idiopathic cardiac hypertrophy. The author's conclusions are that kidney changes are not universal findings in hyperpiesis; that probably some toxic substances not yet found may later be identified in the blood, and that hyperpiesis should probably be designated as a disease sui generis.

Other Books Received

Annual Report of the Surgeon General of the Public Health Service of the United States. For the Fiscal Year 1921. With charts and diagrams. 429 pages. Washington: Government Printing Office, 1922.

Practical Organotherapy: The Internal Secretions in General Practice. By Henry R. Harrower, M.D. Third edition, rewritten and enlarged. Octavo, 416 pp. Glendale, Calif.: The Harrower Laboratory, 1922. Cloth, $1.00 net.

Psychology and Mental Hygiene for Nurses. By Mary B. Eyre, R.N., Pres. Col. Board of Nurse Examiners; Former Superintendent of Nurses, Minnequa Hospital, Pueblo, Col.; Former Superintendent of Nurses, St. Luke's Hospital, Denver, Col.; Former Instructor of Nurses, St. Luke's and St. Joseph's Hospitals, Denver, Col.; Former Assistant Inspector of Schools of Nursing, State Board of Health, Calif.; Former Director Course in Public Health Nursing, University of Colorado and the Colorado Fuel and Iron Co. New York: The Macmillan Co., 1922.

The Practical Medicine Series, Comprising Eight Volumes on the Year's Progress in Medicine and Surgery. Under the General Editorial Charge of Charles L. Mix, A.M., M.D., Professor of Physical Diagnosis in the Northwestern University Medical School.

Vol. VII, Skin and Venereal Diseases. Edited by Oliver S. Ormsby, M.D., Professor and Head of the Department of Skin and Venereal Diseases, Rush Medical College, and James Herbert Mitchell, M.D., Assistant Professor and Chief of the Syphilis Clinic, Department of Skin and Venereal Diseases, Rush Medical College, Series 1921. Chicago: The Year Book Publishers, 1922.

Vol. VIII of the Same Series. Nervous and Mental Diseases. Edited by Peter Bassoe, M.D., Associate Professor of Nervous and Mental Diseases, Rush Medical College.

The Pocket Anatomy. By C. H. Fagge, M.B., M.S., London, F.R.C.S. English Edition. 313 pages. New York: Wm. Wood & Co., 1920.

Southern Medical News

ALABAMA

At a recent meeting of the Council on Medical Education and Hospitals, in Chicago, it was voted that the University of Alabama School of Medicine be rated in "Class A."

The annual meeting of the Medical Association of the State of Alabama was held in Birmingham April 18-21. The following officers were elected: Dr. Walter S. Britt, Eufaula, President; Dr. William D. Gaines, Lafayette, Vice-President of the Northern Division; Dr. H. G. Perry, Secretary. The next meeting will be held in Mobile, April 17-20, 1923.

The Woodlawn Hospital, owned by Dr. J. H. Stephens, Birmingham, was formally opened March 16.

A thoroughly equipped laboratory for the study of the various breeds of mosquitoes, the means of transmission, and the control of malaria as it exists in the Southern states, has been established in Brewton. Dr. A. M. Barber who spent several years studying this disease in the Philippine Islands, is in charge.

Deaths

Dr. Leroy W. Davis, Nauvoo, aged 93, died March 28.

ARKANSAS

The following officers have been elected for Desha County Medical Society: Dr. H. T. Smith, President; Dr. W. H. DeClark, Secretary-Treasurer.

Cross County Medical Society was organized March 30. Eleven new members were enrolled. The following officers were elected: Dr. W. B. Barner, President; Dr. J. D. McKie, Vice-President; Dr. Thomas Wilson, Secretary-Treasurer. The next meeting will be held July 4.

Work on the new $200,000 sanatorium and bath house will soon be started at Hot Springs for the Pythian Lodge.

DISTRICT OF COLUMBIA

A hay-fever prevention clinic has been opened by the Women's Welfare Association, Washington. Physicians will immunize patients with pollen weed serum treatments.

Recently in Washington, the Wapiya (Sioux Indian name for medicine men) was organized, and consists of 100 members of the University Club. The following were elected officers: Dr. Noble P. Barnes, President, "Itanca"; Dr. Everett M. Ellison, Secretary-Treasurer, "Wowabkaga."

Deaths

Dr. Harry Luther Smith, Washington, aged 38, died April 14 at the U. S. Naval Hospital, Chelsea, Mass., from appendicitis.

Dr. Lewis B. Wilson, Washington, aged 56, died March 30 from heart disease.

FLORIDA

The annual meeting of the Florida State Medical Association will be held in Havana, Cuba, June 27-28 instead of June 29, as previously announced.

Capt. W. H. Gillette, U. S. Public Health Service, who has been detailed to the Bureau of Communicable Disease, Division of Venereal Disease Control, is carrying out an extensive program of lectures and motion pictures throughout the State on social hygiene.

The Bureau of Communicable Disease, Dr. George A. Dame, director, is making, through its Division of Field Service, brief surveys of each county covering about one hundred and fifty physical, sociological and sanitary questions that frequently arise in the directing of public health activities in the State.

Under auspices of the Florida Public Health Association and the Fort Pierce City Board of Health, an itinerant chest clinic was held in Fort Pierce March 25. Dr. Louise M. Limbaugh, Jacksonville, and Dr. Theodore A. Blinn were the examiners.

Deaths

Dr. Charles Henry Boyd, West Palm Beach, aged 31, died recently.

Dr. John W. Lowe, Eustis, aged 66, died suddenly March [illegible].

GEORGIA

The Ninth District Medical Society was held at Toccoa March 15. The following officers were elected: Dr. J. D. Mauldin, Gainesville, President; Dr. J. R. Simpson, Gainesville, Vice-President; Dr. J. C. Bennett, Jefferson, Secretary-Treasurer.

Carroll County Medical Society has elected the following officers: Dr. Claud Griffin, Carrollton, President; Dr. C. C. Fitts, Carrollton, Vice-President; Dr. H. L. Barker, Carrollton, Secretary-Treasurer.

Blue Ridge Medical Society has elected the following officers: Dr. C. E. Cox, Blue Ridge, President; Dr. N. C. Goss, Ellijay, Vice-President; Dr. C. B. Crawford, Blue Ridge, Secretary-Treasurer.

Jenkins County Medical Society has elected the following officers: Dr. Q. A. Mulkey, Millen, President; Dr. M. E. Perkins, Millen, Vice-President; Dr. C. Thompson, Millen, Secretary-Treasurer.

Laurens County Medical Society has elected the following officers: Dr. R. J. Campbell, Dudley, President; Dr. T. J. Blackshear, Jr., Dublin, Vice-President; Dr. O. H. Cheek, Dublin, Secretary-Treasurer.

Macon-Taylor County Medical Society has elected the following officers: Dr. R. C. Montgomery, Butler, President; Dr. S. B. Liggin, Montezuma, Vice-President; Dr. R. E. McGill, Montezuma, Secretary-Treasurer.

Mitchell County Medical Society has elected the following officers: Dr. J. L. Brown, Camilla, President; Dr. J. R. Clements, Pelham, Vice-President; Dr. R. A. Hill, Pelham, Secretary-Treasurer.

The physicians of Burke County recently held a meeting in Savannah and organized the Burke County Medical Association. Dr. Cicero H. Cox is President.

The Seventh District Medical Society has elected the following officers: Dr. John Turner McCall, Rome, President; Dr. Mather M. McCord, Rome, re-elected Secretary.

The $250,000 additions to the Government Psychopathic Hospital, Lenwood, have been started.

Dr. Y. A. Little has been appointed Associate Professor in Mental and Nervous Diseases at the Atlanta School of Medicine.

Grady County Medical Society has elected the following officers: Dr. J. B. Warnell, Cairo, President; Dr. J. A. Lindsay, Cairo, Vice-President; Dr. J. E. Wright, Cairo, Secretary-Treasurer.

Dr. L. E. Brawner, Cairo, has entered Harvard Medical School for one and a half years' post-graduate course in eye, ear, nose and throat work.

Dr. John Montfort, Atlanta, and Miss Virginia Neville Taylor, Tacoma, Wash., married at Chevy Chase, Md., recently.

Deaths

Dr. William E. Adams, Madison, aged 54, died April 11 from chronic nephritis.

Dr. William P. Gaffney, LaGrange, aged 64, died April 9 from abscess of the lungs.

Dr. I. N. B. Spence, Social Circle, aged 71, died March 23 from pneumonia.

Dr. Julian Augustus Ward, Quitman, aged 46, died April 6 from pneumonia.

Dr. Needham Lawton Kirkland, Savannah, aged 62, died April 14 from septicemia, resulting from an abscess on his leg.

Dr. Onnie L. Deadwyler, Carlton, aged 51, was killed in an automobile accident March 18.

KENTUCKY

Graves County Medical Society has elected the following officers: Dr. John Dismukes, President; Dr. John G. Puryear, Vice-President; Dr. H. H. Hunt, Secretary-Treasurer.

Dr. Lee Botts will soon reopen his hospital at Glasgow.

Dr. Ethel Stuteville Hernandez has resigned as physician-in-charge of female wards at the Western State Hospital, Hopkinsville.

The Pendleton County Medical Society has elected the following officers: Dr. F. L. Peddicord, President; Dr. O. W. Brown, Vice-President; Dr. B. N. Conner, Secretary-Treasurer.

Dr. L. E. Young, Milan, has been elected County Physician for McCracken County for a period of two years.

The Kentucky Children's Home Society has moved from its old home in Louisville to Lyndon.

A new sanatorium is being erected at Dawson.

Drs. J. A. Ryan and Clifford N. Heisel, both of Covington, have gone to Europe to take graduate courses in Vienna.

Dr. Finis London, Woodburn, and Miss Emma Downey, near Woodburn, were married April 1.

Deaths

Dr. Hilary D. Rodman, Springfield, aged 68, died February 26 from cerebral hemorrhage.

Dr. John B. Grant Sparta, aged 76, died at Dayton, Ohio, April 12 from senility.

Dr. William Addison Richards, Morganfield, aged 68, died following a long illness.

Dr. B. T. Abernathy, Big Sandy, died recently from pneumonia.

Dr. J. F. Lockhard, Mt. Sterling, died recently from heart trouble following the amputation of his foot.

(Continued on page 38)

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(Continued from page 522)

Dr. James A. Harper, Winchester, aged 58, died recently.
Dr. Henry C. Fleming, Henderson, died April 17.

LOUISIANA

At the recent meeting of the Louisiana State Medical Society the following officers were elected: Dr. Paul J. Gelpi, New Orleans, President; Drs. G. M. G. Stafford, Alexandria, Charles V. Unsworth, New Orleans, and Courtland P. Gray, Monroe, Vice-Presidents; Dr. Paul T. Talbot, New Orleans, Secretary-Treasurer.

Physicians from twelve parishes met in Baton Rouge recently and organized the Sixth Congressional District Medical Society. The following were elected officers: Dr. J. W. Lea, East Feliciana, President; Drs. A. W. Martin, Ascension, W. L. Grace, Iberville, P. H. Jones, East Baton Rouge, E. M. Toler, East Feliciana, N. F. Bray, Livingston, R. McG. Carruth, Pointe Coupee, A. F. Newman, St. Helena, A. G. Maylie, St. Tammany, L. D. McGehee, Tangipahoa, L. W. Brock, St. Landry, M. L. Levert, West Baton Rouge, and J. M. Kilbourne, West Feliciana, Vice-Presidents; Dr. B. O. LeBlanc, Iberville, Secretary. The annual meetings will be held in Baton Rouge.

At the recent annual meeting of the Board of Directors of the Eye, Ear, Nose and Throat Hospital, New Orleans, the following officers were elected: Mr. W. R. Stauffer, President; Mr. Walter H. Cook, First Vice-President; Mr. Warren Kearney, Second Vice-President; Mr. Marcus Walker, Treasurer; Mr. Joseph A. Hincke, Secretary.

At the recent meeting of the Louisiana State Medical Society, a meeting of the various Parish Secretaries was held and an association of Parish Medical Society Secretaries organized. The following officers were elected: Dr. B. K. Parish, Mansfield, President; Dr. Elizabeth Bass, New Orleans, Secretary. The meetings will be held annually in conjunction with the annual meeting of the State Medical Society.

There soon will be erected a new building which will accommodate the departments of Botany, Zoology, Pharmacology and Physiologic Chemistry at Tulane University of Louisiana School of Medicine, New Orleans. It will be a four-story building and will cost approximately $180,000. The laboratory will be equipped at a cost of $30,000.

In commemoration of the completion of his sixtieth year in the active practice of medicine, the Orleans Parish Medical Society presented Dr. Ernest Sidney Lewis, New Orleans, with a loving cup. Dr. Lewis is 81 years old.

Dr. Henry J. Dauterive has been elected Chairman and Dr. Walter F. Carstens Health Officer of the New Iberia Parish Board of Health.

The public health laboratory established in Monroe by the State Board of Health is to look after the work of northwestern Louisiana, for which no fees will be accepted.

Dr. William R. Lastrapes has been elected President of the Medical Examining Board for the Bureau of Pensions at Opelousas.

Deaths

Dr. Howard Pascal Brisbane, Clarks, aged 62, died March 27.
Dr. G. M. Huckabay, Shreveport, aged 48, died April 10.
Dr. Preston E. Waddell, Natchitoches, aged 60, died March 30.

MARYLAND

Dr. Harry Richmond Slack, Jr., formerly of LaGrange, Ga., Associate Professor of Laryngology, Johns Hopkins University Medical Department, Baltimore, has been appointed Exchange Professor to the Union Medical College in Peking, China. Dr. Slack will have charge of the Department of Oto-Laryngology. He will sail the first of August.

The Medical and Chirurgical Faculty of Maryland, at its recent annual meeting, elected the following officers: Dr. Herbert Harlan, Baltimore, President; Drs. James M. H. Rowland, Harry Friedewald and Peregrine Wroth, Jr., Vice-Presidents; Dr. Joseph Albert Chatard, Secretary; Dr. Charles E. Brack, Treasurer.

Dr. Joseph C. Bloodgood, Baltimore, is one of the ten men selected from the 20,000 alumni of the University of Wisconsin for a place in the Wisconsin Hall of Fame.

Major Frank Gordon, U. S. Veterans' Bureau Hospital No. 56, Fort McHenry, Baltimore, has been transferred and Major Milton H. Foster has succeeded him.

A venereal disease clinic in the Provident Hospital for

(Continued on page 40)

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(Continued from page 38)

negroes will be opened. Two negro physicians and a negro social worker will have charge of the clinic.

Dr. H Canby Robinson, Professor of Medicine, Johns Hopkins University Medical Department, Baltimore, will return to his post as Professor of Medicine and Dean of the Vanderbilt University Medical Department, Nashville, Tenn., on July 1. He will be succeeded by Dr. Warfield Theobald Longcope, New York, who was formerly Bard Professor of Medicine at Columbia University and Physician-in-Chief at the Presbyterian Hospital, New York.

Dr. Joseph C. Swenarton has been appointed Assistant Director of the Bureau of Bacteriology of the Baltimore City Health Department.

A hospital for contagious diseases will soon be erected near Lake Montebello.

Work has been begun on the Clinic Building of Johns Hopkins Hospital, Baltimore. The building will cost $600,000.

Dr. Lyman S. Abbott has been appointed Health Officer at Baltimore and assigned to tuberculosis dispensary work.

Deaths

Dr. Corydon P. Gowman, Mount Airy, aged 60, died March 26.

Dr. Henry Briscoe Thomas, Baltimore, aged 67, died suddenly April 2.

MISSISSIPPI

The new community hospital, Brookhaven, was opened on April 9.

A new hospital will be erected at Clarksdale at a cost of $50,000.

Deaths

Dr. L. Leo Newman, Ecru, aged 55, died suddenly March 30 from heart disease.

MISSOURI

The annual fee for students at the Washington University Medical School, St. Louis, will be increased from $200 to $300 per year, according to a recent announcement.

Dr. Major G. Seelig, St. Louis, for extension of his work on some uses of magnesium in surgery, has been granted $400. The work is conducted in the surgical laboratories of the Washington University School of Medicine, St. Louis.

The Polk County Health Association was recently organized at a meeting in Bolivar. William H. Picketts, U. S. Public Health Service, is President; Dr. Thomas Parran, Jr., Jefferson City, joint representative of the U. S. Public Health Service, Rockefeller Foundation and the Missouri State Board of Health, was present at the meeting.

The Western Electro-Therapeutic Association was held in Kansas City April 20-21. The following officers were elected: Dr. T. Howard Plank, Chicago, Ill., President; Dr. H. H. Bowing, Rochester, Minn., First Vice-President; Dr. M. P. Springer, Tulsa, Okla., Second Vice-President; Dr. W. P. Grimes, Kansas City, Treasurer; Dr. J. R. Shumway, Pleasanton, Kans., Registrar; Dr. Frank J. Iuen, Kansas City, Dr. Curran Pope, Louisville, Ky., Board of Trustees; Dr. Charles Wood Fassett, Kansas City, Secretary. The next meeting will be held in Kansas City April, 1923.

Dr. Richard L. Sutton, Kansas City, was presented with the honorary degree of Doctor of Laws at the eighth annual commencement of the University of Missouri at Columbia.

Dr. M. J. Armstrong, Webb City, has resigned as Superintendent of the Jasper County Tuberculosis Hospital.

Deaths

Dr. Thomas Napoleon Bogart, Excelsior Springs, aged 53, died March 28.

Dr. Ignatius Walthall Powell, St. Louis, aged 46, died April 6 from pneumonia.

Dr. Reginald Huber Meade, Kansas City, aged 50, died March 10.

Dr. Joseph B. Hawkins, Mexico, aged 78, died April 16 from cerebral hemorrhage.

Dr. John Hilman, Gallatin, aged 85, died March 14 at Hollister.

Dr. James A. Mairs, Browning, aged 66, died March 9 from pleurisy.

Dr. Henry H. Summa, St. Louis, aged 68, died April 9 at West Palm Beach from heart disease.

Dr. William G. Safford, Tarkio, aged 71, died March 12.

NORTH CAROLINA

A gift of $100,000 has been made to Rutherford Hospital, Rutherfordton, for the purpose of equipping the hospital

(Continued on page 42)

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ORGANOTHERAPY

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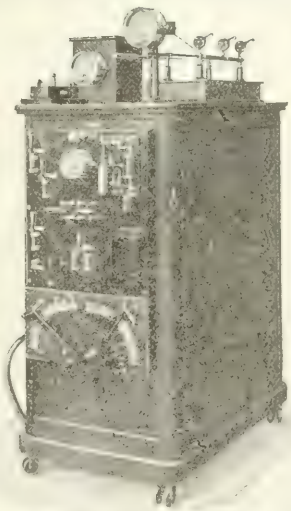

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(Continued from page 40)

for radium treatment. This gift was made by J. C. Plonk, Hickory, as a memorial to his wife.

Plans for the $35,000 nurses' home for Mercy Hospital, Monroe, have been completed.

A tuberculosis school, consisting of thirty medical officers and thirty nurses, drawn mostly from other public health service hospitals, will be conducted by the U. S. Public Health Service, June 1-30, at the Government Tuberculosis Sanatorium in Oteen.

The Ambler Tuberculosis Sanatorium, Asheville, was recently opened.

At a meeting of the Eighth District Medical Society and the hospital staffs of Winston-Salem, Greensboro and High Point, the following officers were elected: Dr. Walter F. Cole, Greensboro, President; Dr. John A. Williams, Secretary.

The former home of Dr. Wilson, Shelby, containing 18 acres and a house and lot adjoining, will be the site for a new hospital to be erected at a cost of $100,000.

Dr. Frank L. Ray, Charlotte, and Miss Ethel Graham Woods, Purley, were married March 19.

Deaths

Dr. Harry Grimmett Hunter, Hendersonville, aged 25, died April 8 from influenza.

Dr. Kemp Plummer Battle, Raleigh, aged 63, died March 23 at Philadelphia, following a long illness.

Dr. William Wade Olive, Durham, aged 44, died April 6.

Dr. George Alexander Ramsauer, China Grove, aged 64, died March 11 from chronic nephritis.

Dr. Thomas Benton Ashby, Mt. Airy, aged 50, died April 10 from heart disease.

Dr. Edward King, Sharpsburg, aged 59, died recently following a stroke of paralysis.

OKLAHOMA

The Clinton State Hospital for tuberculous patients was opened April 3.

Dr. Earl D. McBride has been given charge of the Red Cross Orthopedic work in Oklahoma City.

The contract has been let for the construction of the City Hospital, Tulsa, at a cost of $44,180.

Work on the Soldiers' Hospital, Muskogee, will soon be started. The Hospital will cost $500,000.

Hominy is to have a new hospital.

The new hospital to be built at Watonga is to cost $20,000.

Deaths

Dr. Thomas William Brewer, Oklahoma City, aged 58, died April 11.

SOUTH CAROLINA

At a recent meeting of the physicians and dentists of Batesburg, the Batesburg Medical Society was organized. It is an auxiliary to the Lexington County Medical Society. Dr. Washington P. Timmerman is President; Dr. Albert Lee Ballenger, Secretary.

The South Carolina State Medical Association has elected the following officers: Dr. Charles Fred Williams, Columbia, President; Drs. Samuel Lindsay, Winnsboro, and Joseph Roddy Miller, Rock Hill, Vice-Presidents; Dr. Edgar A. Hines, Secretary-Treasurer. Charleston was selected as the next meeting place.

Greenville County will have a traveling dental clinic for the school children in the rural districts for three months to educate the children in dental hygiene.

The Palmetto Medical Association, held in Aiken April 25-28, elected the following officers: Dr. William M. Thorne, Charleston, President; Dr. C. Johnson, Aiken, Secretary. The next meeting will be held in Camden.

Oconee County Medical Society has elected the following officers: Dr. W. C. Marett, President; Dr. W. A. Strickland, Vice-President; Dr. E. A. Hines, Secretary-Treasurer.

Darlington County Medical Society has elected the following officers: Dr. A. D. Gregg, Society Hill, President; Drs. W. L. Byerly, Hartsville, and Dr. O. A. Alexander, Darlington, Vice-Presidents; Dr. Julian T. Coggeshall, Darlington, Secretary; Dr. J. W. Willcox, Darlington, Treasurer.

Dr. Bascomb L. Chipley has resigned as Physician-in-Charge of the Greenville Free Clinic and has been succeeded by Dr. James E. Daniel.

A health campaign is to be conducted in Greer for a period of one year, under the direction of the State Board

(Continued on page 44)

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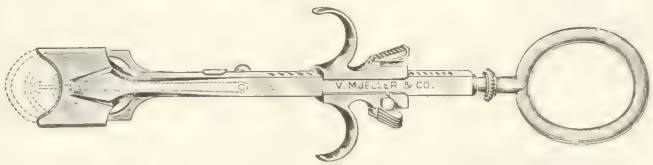

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(Continued from page 42)

of Health and the U. S. Public Health Service. Half of the expense will be borne equally by the State and the International Health Board; the other half jointly by the City of Greer and the cotton mill interests of Greer.

A drive to rid Greenville of rodents was launched March 20 through the cooperation of the Women's Bureau of the Chamber of Commerce and the health department of the city.

Dr. C. Q. West, Greenville, has been elected Chairman of the County Charities and Corrections Commission, succeeding Dr. C. C. Geer, who resigned.

Allendale County Medical Society has elected the following officers: Dr. J. E. Warnock, Allendale, President; Dr G. W. I. Loadholt, Fairfax, Secretary-Treasurer.

Dr. Paden E. Woodruff and Miss Mildred O. Cox, both of Pickens, were married March 22.

Deaths

Dr. George W. Heinitsh, Spartanburg, aged 63, died April 4.

Dr. Simon P. Rentz, Branchville, died March 22, when the car in which he was riding overturned and his neck was broken.

TENNESSEE

Carroll County Medical Society has elected the following officers: Dr. H. T. Collier, McKenzie, President; Dr. R. A. Douglass, Huntington, Secretary.

The offices of the Journal of the Tennessee State Medical Association have been removed to the office of Dr. Larkin Smith, Nashville. Dr. Smith was recently elected Secretary of the Association, succeeding Dr. Olin West.

The Executive Committee of Tennessee Baptists recently granted $60,000 to the Baptist Memorial Hospital, Memphis.

Dr. Robert P. Oppenhimer, Knoxville, has been appointed a member of the Board of Education.

The following have been appointed members of the State Board of Medical Examiners: Dr. F. B. Hulme, Pulaski, and Dr. John W. Ogle, Sevierville.

Dr. R. M. Colmore has succeeded Dr. Wm. W. Dickey as Director of the Venereal Clinics, Chattanooga. Dr. Dickey recently resigned.

The following have been elected medical inspectors for Knoxville: Drs. Colvin C. Perdue and Earl C. Ford.

Deaths

Dr. Edward P. Gould, Chattanooga, aged 72, died April 5.

Dr. George B. Malone, Memphis, aged 77, died April 13 at St. Joseph's Hospital from cerebral hemorrhage.

Dr. Henry P. Coile, Knoxville, aged 69, died April 6.

Dr. John S. Bumpas, Mount Pleasant, aged 61, died March 19 from cerebral hemorrhage.

Dr. J. P. McCollum, Jackson, died suddenly April 15 from heart disease.

Dr. Walton P. Allen, Dayton, aged 39, died April 30.

Dr. Gus S. Shipley, Athens, aged 52, died April 30.

Dr. Charles H. Bader, Nashville, died April 15.

Dr. M. A. McPherson, Knoxville, aged 65, died April 6.

TEXAS

Panhandle District Medical Society has elected the following officers: Dr. W. Wilson, Memphis, President; Drs. H. L. Wilder, Clarendon, G. F. LeGrand, Hereford, Vice-Presidents; Dr. J. J. Crume, Amarillo, re-elected Secretary Treasurer.

Seventh District Medical Society has elected the following officers: Dr. A. A. Ross, Lockhart, President; Dr. Edmund Doak, Taylor, Vice-President; Dr. Morris Boerner, Austin, Secretary.

Knox-Haskell County Medical Society has elected the following officers: Dr. W. J. Masters, Knox City, President; Dr. W. M. Taylor, Goree, Vice-President; Dr. T. S. Edwards, Knox City, Secretary-Treasurer.

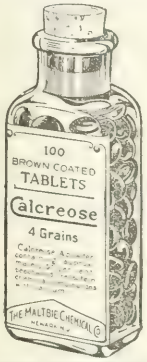
Medina-Uvalde-Maverick-Val Verde-Terrell-Edwards - Real-Kinney-Zavalla County Medical Society has elected the following officers: Dr. A. R. Bowman, Uvalde, President; Dr. H. B. Ross, Del Rio, Vice-President; Dr. Oreno Cantu, re-elected Secretary-Treasurer.

Scurry-Dickens-Kent County Medical Society has elected the following officers: Dr. J. T. Whitmore, Snyder, President; Dr. A. C. Leslie, Snyder, Vice-President; Dr. L. E. Trigg, Snyder, Secretary-Treasurer.

According to an announcement by the Trustees of the Hermann Hospital Estate, Houston, a four-unit Hermann Hospital will be built at an approximate cost of $600,000. One hundred and fifty beds will be devoted to charity.

(Continued on page 46)

CALCREOSE



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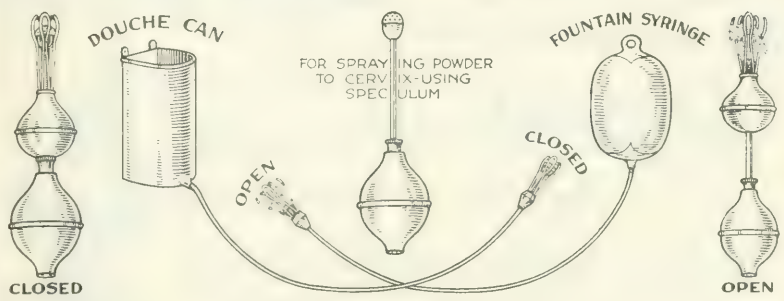

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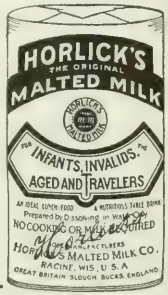

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RACINE, WIS.

(Continued from page 44)

Dr. J. L. Hooper, Denton, was recently employed as County Health Officer for part of his time.

The Masonic Hospital Association has purchased the Rolston Hospital, El Paso, for $130,000.

Dr. R. B. Alexander has been appointed Assistant Instructor in the Department of Medicine at the University of Texas Medical College, Galveston.

Dr. W. S. Carter, Department of Physiology, University of Texas Medical Department, Galveston, recently went to the Philippine Islands to represent the Rockefeller Foundation in the University of the Philippines, College of Medicine and Surgery, Manila.

Dr. H. Earl Rogers, a member of the City Health Department, Dallas, has resigned and will practice in New York, N. Y.

Dr. Clarence W. Coutant has resigned as Medical Director of the Southern Baptist Sanatorium, El Paso, to become Assistant to the Medical Officer, Fourteenth District, U. S. Veterans' Bureau, Dallas.

The hospital buildings of the John Sealy Hospital, Galveston, will be enlarged and remodeled.

Dr. Willis J. Pollard has been appointed City Health Officer of Kaufman, succeeding the late Dr. Burrel Jefferson Hubbard.

Dr. William G. Howell, Associate Physician, Cragmor Sanatorium, Colorado Springs, Colo., has been appointed Director of the Baptist Sanatorium, El Paso.

Dr. Delano Richard Aves, Hearne, and Miss Laura Marion Mason, Milwaukee, Wis., were married April 24.

Dr. R. E. Van Duzen, Dallas, and Miss Barbara Shaw, Galveston, were recently married.

Dr. Josephus C. Young and Miss Willie Price Mizell, both of Dallas, were married April 1.

Deaths

Dr. Burrell Jefferson Hubbard, Kaufman, aged 64, died March 23 from acute indigestion.

Dr. Wesley Asbury Rape, Victoria, aged 57, died in a hospital at Cuero March 27.

(Continued on page 48)

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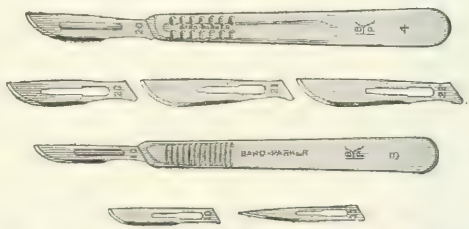

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(Continued from page 46)

VIRGINIA

Nansemond Medical Society has elected the following officers: Dr. F. J. Morrison, President; Dr. C. J. Riddick, Vice-President; Dr. C. F. Griffin, Secretary.

At the recent organization meeting of the Medical Society of Warrenton, Dr. Stephen Harnsberger was elected President; Dr. W. G. Trow, Vice-President; Dr. W. B. Carr, Secretary-Treasurer.

Dr. Waller Nelson Mercer has been appointed Chief Clinical Physician-in-Charge of the Tuberculosis Division of the Richmond Health Bureau to succeed Dr. Dean B. Cole, resigned.

The following have been reappointed members of the Medical Examining Board of Virginia: Drs. J. H. Ayres, Accomack; Philip St. L. Moncure, Norfolk; H. U. Stephenson, Toano; J. Bolling Jones, Petersburg; I. C. Harrison, Danville; John W. Preston, Roanoke; P. W. Boyd, Winchester; S. W. Maphis, Warrenton; W. W. Chaffin, Pulaski; Robert Glasgow, Lexington, allopathic members; Dr. E. H. Shackelford, Richmond, osteopathic member. Dr. G. W. Johnson, Danville, was appointed as the homeopathic member.

As a memorial to the late Dr. Edward McGuire, the Edward McGuire Memorial Association will endow a cot in the Crippled Children's Hospital, Richmond.

The Newport News Medical Society, composed of negro physicians, has been organized at Newport News. Dr. P. A. Scott was elected President; Dr. C. A. Eaton, Vice-President; Dr. W. T. Foreman, Treasurer; Dr. J. H. Robinson, Secretary.

Dr. R. R. Nevitte, Temperanceville, lost his home by fire on March 4. The loss is estimated at about $20,000.

The $25,000 addition to the Protestant Hospital, Norfolk, will soon be under construction.

Dr. Stuart McGuire, Richmond, at a recent meeting of the Stonewall Jackson Camp, Sons of Confederate Veterans, was elected a member of the Membership Committee.

Gifts of $60,000 have been made for the addition of an orthopedic wing to the University of Virginia Hospital, Charlottesville.

Dr. George P. Hamner has been elected Secretary of the Presbyterian League, Lynchburg.

(Continued on page 50)

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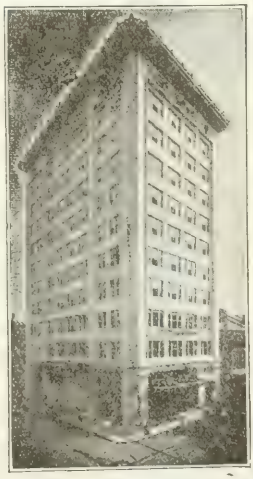

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(Continued from page 48)

Virginia leads all the Southern states, with the exception of Texas, in the sale of Christmas seals, as given out in a report by the National Tuberculosis Association. Up to the middle of March the Virginia Tuberculosis Association had received $51,106.76 from the sale of seals, and there were seven counties yet to be heard from.

Dr. Lawrence T. Price, Richmond, has been elected President of the Commercial League, an amateur baseball organization of the city.

It has been announced that work will soon be commenced on the $250,000 seven-story office building for physicians and dentists to be erected in Richmond.

Deaths

Dr. Charles U. Gravatt, Port Royal, aged 72, died at the Johnson-Willis Sanatorium, Richmond, April 14 following a stroke of paralysis.

Dr. William Turner Jordan, Driver, aged 86, died March 13.

WEST VIRGINIA

Fayette Medical Society has elected the following officers: Dr. S. W. Price, President; Dr. L. O. Fox, First Vice-President; Dr. J. H. Bannister, Second Vice-President; Dr. H. L. Goodman, Secretary-Treasurer, re-elected.

Work has been started on the two-story building adjoining the Hawes-Marple Hospital on Eleventh Street, Huntington. The entire second floor will be fitted up to adjoin the second floor of the Hawes-Marple Hospital and will be used for hospital work. The first floor will be used as a store room.

Deaths

Dr. Silas Alfred Cavalier, Beverly, aged 66, died April 10.

Dr. Charles H. McLane, Morgantown, aged 78, died April 18 from pneumonia.

Dr. Elisha M. Cox, Fairmont, aged 58, died March 27 from ascites.

GENERAL

At the recent meeting of the Southern Minnesota Medical Association, held in Rochester, Dr. Willis Campbell, Memphis, Tenn., and Dr. M. G. Seelig, St. Louis, Mo., were guests and appeared on the program.

The Colorado Congress of Ophthalmology and Oto-Laryngology will be held in Denver, Colo., July 28-29.

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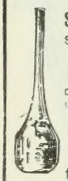

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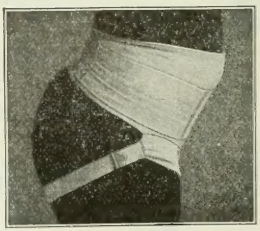

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